Index to 1984 NASA Tech Briefs

Volume 9, Numbers 1-4 **FEBRUARY 1987**

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N92-70025
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Electronic Components and Circuits

Electronic Systems

Physical Sciences

Materials

Computer Programs

Mechanics

Machinery

Fabrication Technology

Mathematics and Information Sciences

Life Sciences

(NASA-TM-89331) INDEX TO 1984 NASA TECH BRIEFS, VOLUME 9, NUMBERS 1-4 (NASA) 81 p

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INTRODUCTION

Tech Briefs are short announcements of new technology derived from the research and development activities of the National Aeronautics and Space Administration. These briefs emphasize information considered likely to be transferrable across industrial, regional, or disciplinary lines and are issued to encourage commercial application.

This *Index to NASA Tech Briefs* contains abstracts and four indexes — subject, personal author, originating Center, and Tech Brief Number — for 1984 Tech Briefs.

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The January 1982 edition of the *NASA Thesaurus* (NASA SP-7051) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index. Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service at $35.00 for Volume 1 and $20.00 for Volume 2.

Originating Center Prefixes

ARC	Ames Research Center
GSC	Goddard Space Flight Center
HQN	NASA Headquarters
KSC	Kennedy Space Center
LAR	Langley Research Center
LEW	Lewis Research Center
MFS	Marshall Space Flight Center
MSC	Johnson Space Center (formerly Manned Spacecraft Center)
NPO	Jet Propulsion Laboratory/NASA Pasadena Office

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TABLE OF CONTENTS

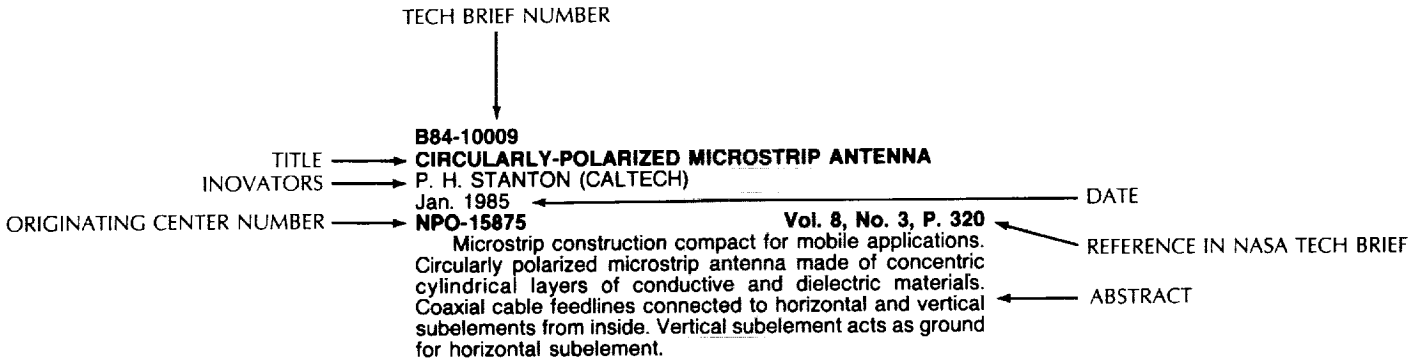
Abstract Section

Category 01 Electronic Components and Circuits 1
02 Electronic Systems 5
03 Physical Sciences 9
04 Materials 13
05 Life Sciences 16
06 Mechanics 17
07 Machinery 24
08 Fabrication Technology 28
09 Mathematics and Information Sciences 33

Indexes

Subject I-1
Personal Author I-21
Originating Center/Tech Brief Number I-35
Tech Brief/Originating Center Number I-39

TYPICAL ABSTRACT ENTRY



Index to 1984 NASA Tech Briefs
FEBRUARY 1987

Abstract Section

01 ELECTRONIC COMPONENTS AND CIRCUITS

B84-10001
BATTERY-OPERATED HIGH-VOLTAGE POWER SUPPLY
A. P. RUITBERG and M. KENNETH
Jan. 1985
GSC-12818 **Vol. 8, No. 3, P. 313**
Circuitry allows large multiplication of voltage. Filament voltage is -80kV. Potential difference between terminals P3 and P4 adjusted to make grid 80 to 150 volts more negative than filament enabling grid to focus electrons from filament into stream impinging on anode, which then emits x-rays. Circuitry provides independently adjustable voltages in kilovolt range for x-ray tubes and other instruments.

B84-10002
X-BAND STRIP-LINE POWER DIVIDER/COMBINER
B. L. CONROY (CALTECH)
Jan. 1985
NPO-16086 **Vol. 8, No. 3, P. 314**
Strip-line circuit for X-band signals both divides and combines microwave power for distributed amplifier. Strip-line pattern (foil pattern over insulating layer over ground plane) laid out so all eight distributed ports lie at electrical distances of odd integral multiples of half wavelength from main input/output port. Strip line used as power divider and as power combiner.

B84-10003
OPTICAL LOGIC GATES
E. R. DU FRESNE (CALTECH) and W. L. DOWLER (CALTECH)
Jan. 1985
NPO-15134 **Vol. 8, No. 3, P. 314**
Logic gates for light signals constructed from combinations of prisms, polarizing plates, and quarterwave plates. Optical logic gate performs elementary logic operation on light signals received along two optical fibers. Whether gate performs OR function or exclusive-OR function depends on orientation of analyzer. Nonbinary truth tables also obtained by rotating polarizer or analyzer to other positions or inserting other quarter-wave plates.

B84-10004
TUNING CONCEPT FOR RESONANT CAVITIES
R. L. SYDNOR (CALTECH)
Jan. 1985
NPO-15890 **Vol. 8, No. 3, P. 315**
Deviations from resonance detected by sampling phases. Automatic tuner feedback control system derives error signal from E and H plane probe signals. Control objective to maintain phase difference between E and H at 90 degrees. Technique estimated to sensitive to fractional frequency deviation of about 5 X 10-16 and applicable not only to masers but also other microwave elements, including klystrons, general purpose oscillators, and frequency standards.

B84-10005
ISOLATION MOUNTING FOR CHARGE-COUPLED DEVICES
W. C. GOSS (CALTECH) and P. M. SALOMON (CALTECH)
Jan. 1985
NPO-15551 **Vol. 8, No. 3, P. 316**
CCD's suspended by wires under tension. Remote thermoelectric cooling of charge coupled device allows vibration isolating mounting of CCD assembly alone, without having to suspend entire mass and bulk of thermoelectric module. Mounting hardware simple and light. Developed for charge-coupled devices (CCD's) in infrared telescope support adaptable to sensors in variety of environments, e.g., sensors in nuclear reactors, engine exhausts and plasma chambers.

B84-10006
SEMICONDUCTOR LASER PHASED ARRAY
J. KATZ (CALTECH)
Jan. 1985
NPO-15963 **Vol. 8, No. 3, P. 317**
Oscillations synchronized and modulated individually for beam steering. Phased array of GaAs infrared lasers put out powerful electronically-steerable coherent beam. Fabricated as integrated circuit on GaAs chip, new device particularly suited to optical communications, optical data processing and optical detection and ranging systems.

B84-10007
DIRECT-CURRENT UNBALANCE DETECTOR
A. P. WAGNER (CALTECH)
Jan. 1985
NPO-15978 **Vol. 8, No. 3, P. 318**
Short circuits to ground indicated by voltage changes. Current transducer connected in bridge circuit with floating 30-Vdc power supply measures voltage unbalance between positive and negative powerlines and ground. Detection circuit output swings higher or lower than normal balanced condition voltage to signify unbalance toward positive or negative side respectively. Circuit configuration adaptable to monitor 4- to 20-mA current loops often found in industrial controls.

B84-10008
CIRCUIT FOR MONITORING CELL VOLTAGES
J. W. LEPISTO (TRW, Inc.)
Jan. 1985
MFS-25924 **Vol. 8, No. 3, P. 319**
Circuit monitors voltage of each cell in electrical battery

within few millivolts. Circuit includes two bipolar analog multiplexers: repeatedly sample outputs of 12 1.5 volt cells. Terminals of multiplexer 1 connected to positive sides of cells and terminals of multiplexer 2 connected to negative sides. Outputs of multiplexers connected to differential operational amplifier: provides signals for recording and display.

B84-10009
CIRCULARLY-POLARIZED MICROSTRIP ANTENNA
P. H. STANTON (CALTECH)
Jan. 1985
NPO-15875 **Vol. 8, No. 3, P. 320**

Microstrip construction compact for mobile applications. Circularly polarized microstrip antenna made of concentric cylindrical layers of conductive and dielectric materials. Coaxial cable feedlines connected to horizontal and vertical subelements from inside. Vertical subelement acts as ground for horizontal subelement.

B84-10010
POWERLINE COUPLER FOR WINDMILL MOTOR/GENERATORS
F. NOLA
Jan. 1985
MFS-25944 **Vol. 8, No. 3, P. 321**

Efficiency at low windspeed increased by firing-angle control. Power coupled from wind-driven induction motor/generator to ac powerline with help from circuit. Circuit reduces power consumed by field windings thereby improving efficiency at low windspeeds. Circuit includes zerocrossing detector, ramp generator and comparator similar to those used to set firing angles for thyristors in power factor motor controllers.

B84-10011
IMPROVED RF ISOLATION AMPLIFIER
G. L. STEVENS (CALTECH) and J. MACCONNELL (CALTECH)
Jan. 1985
NPO-16026 **Vol. 8, No. 3, P. 322**

Circuit has high reverse isolation and wide bandwidth. Wideband isolation amplifier has low intermodulation distortion and high reverse isolation. Circuit does not require selected or matched components or directional coupling device. Circuit used in applications requiring high reverse isolation such as receiver intermediate-frequency (IF) strips and frequency distribution systems. Also applicable in RF and video signaling.

B84-10012
DIGITAL SEQUENCE CONTROLLER
J. O. LONBORG (CALTECH)
Jan. 1985
NPO-15725 **Vol. 8, No. 3, P. 323**

Length and timing of pulse sequences user controlled. Digital circuit generates several pulse streams to control loads that must be synchronized allowing duration and phasing of each stream to be varied independently. Application of circuit to control pump for biomedical applications.

B84-10013
SOFTWARE FOR PROM PROGRAMING
C. W. GOOLSBY (Rockwell International Corp.)
Jan. 1985
MSC-20641 **Vol. 8, No. 3, P. 323**

Driver program allows for programing, reading, and verification of various PROM's. Manual entry of data to DATA/I/O PROM Programmer timeconsuming and error-prone. Driver program combines file management capability of EXORCISOR with flexibility of DATA I/O system. Provides user with way of reading, programing and verifying PROM's storing data on disk, modifying files and printing data.

B84-10014
COMPUTERIZED INTERACTIVE HARNESS ENGINEERING
J. W. BILLITTI (CALTECH)
Jan. 1985
NPO-16272 **Vol. 8, No. 3, P. 324**

Computerized interactive harness engineering program inexpensive, interactive system for learning and using engineering approach to interconnection systems. Basically data-base system that stores information as files of individual connectors and handles wiring information in circuit groups stored as records.

B84-10015
ANTENNA RADIATION-PATTERN PROGRAM
R. D. HUGHES (CALTECH), C. N. GUIAR (CALTECH), and C. L. LAWSON (CALTECH)
Jan. 1985
NPO-16217 **Vol. 8, No. 3, P. 324**

Effects of reflector deformations and feed characteristics computed. JPL Antenna Radiation Pattern computer program ANRAD, evaluates performance of radio-frequency antenna with paraboloidal main reflector by solving scalar far-field radiation pattern integral.

B84-10016
TEMPERATURE-STABILIZED PHASE DETECTOR
L. YEEMAN
Jan. 1985
NPO-15766 **Vol. 8, No. 3, P. 324**

Precise temperature stabilized phase detector for clock signal distribution maintains 100-MHz signal with stability of 5 parts in 10 to the 16th power even for step changes of 20 degrees C in ambient temperature. Stabilization achieved by heating unit to 45 degrees C and maintaining temperature through bridge circuit.

B84-10017
NEGATIVELY COUPLED INDUCTORS FOR ODD-PHASE CHOPPERS
R. S. JAMIESON (CALTECH)
Jan. 1985
NPO-15380 **Vol. 8, No. 3, P. 325**

Splitting windings of output inductors of negatively-coupled 'boost' chopper extends applicability to odd number of phases including three phases. New version concatenates output inductors of each phase with those of neighboring phases achieving negative coupling effect that suppresses unwanted harmonics.

B84-10018
MATHEMATICAL STORAGE-BATTERY MODELS
C. P. CHAPMAN (CALTECH) and M. ASTON (CALTECH)
Jan. 1985
NPO-15615 **Vol. 8, No. 3, P. 325**

Empirical formula represents performance of electrical storage batteries. Formula covers many battery types and includes numerous coefficients adjusted to fit peculiarities of each type. Battery and load parameters taken into account include power density in battery, discharge time, and electrolyte temperature. Applications include electric-vehicle 'fuel' gages and powerline load leveling.

B84-10019
IMPROVED SPARK-IGNITOR CIRCUITRY
D. G. OLSCHANSKY (Rockwell International Corp.)
Jan. 1985
MFS-19751 **Vol. 8, No. 3, P. 325**

Transformer reduces flyback voltage 350 V. Several modifications made to inductive discharge spark-ignitor system for rocket engine, which substantially reduce complexity of circuits and eliminate difficulties associated with component matching.

B84-10020
STOWABLE SOLAR-CELL ARRAY
P. M. STELLA (CALTECH)
Jan. 1985

NPO-15893 **Vol. 8, No. 3, P. 325**

Solar electric power source easily storable and transportable. Source employs blanket of photovoltaic cells rolled up when not in use. The hollow core of canister reel used as storage space for radio equipment or first aid supplies, etc.

B84-10021
BURNWIRE SIMULATOR
G. L. BUMMER (CALTECH)
Jan. 1985
NPO-15883 **Vol. 8, No. 3, P. 325**

Fuse-containing device simulates pyrotechnic firing circuitry. Simulator includes housing receptacle connector at one end, and fuse at opposite end. Fuse circuit useful in any system having complex built-in wiring for current pulse applications.

B84-10022
A SENSITIVE INFRARED PHOTODETECTOR
S. K. SRIVASTAVA (CALTECH) and L. MALEKI (CALTECH)
Jan. 1985
NPO-15926 **Vol. 8, No. 3, P. 325**

Technique utilizing photodetachment of negative ions incorporated into sensitive photodetector which allows detection of low-energy infrared photons, without resorting to cryogenic cooling.

B84-10023
PRECISE CONTROL OF A TUNABLE IR DIODE LASER
R. T. MENZIES (CALTECH) and C. W. RUTLEDGE (CALTECH)
Jan. 1985
NPO-16000 **Vol. 8, No. 3, P. 326**

Tuning system applicable to lead-salt semiconductor tunable diode laser (TDL) and other solid-state lasers with temperature and current dependent emission wavelength developed for balloon borne, highresolution spectrometer that measures trace atmospheric constituents in stratosphere. Instrument measures absorption at approximately 20 points in 100 MHz wide spectral line.

B84-10024
TUBE-WALL THICKNESS DETECTOR
R. E. KLEINT (Rockwell International Corp.) and R. D. BAILY (Rockwell International Corp.)
Jan. 1985
MFS-19741 **Vol. 8, No. 3, P. 326**

Eddy-current measurements detect wear of thin walls (0.01 in) (0.25 mm) in small diameter (0.19 in) (5 mm) heat exchanger tubing. Flexible durable thin rod inserts eddy-current coil into the heat exchanger tube.

B84-10025
TWIST-FREE WIRE STRANDING
R. W. HINES (Honeywell, Inc.)
Jan. 1985
MFS-25914 **Vol. 8, No. 3, P. 326**

Device for wire-stranding operations provides uniform tension and twist-free conditions for 30 gage or smaller high strand density flexible cable assemblies.

B84-10225
HIGH-FREQUENCY, HIGH-POWER CAPACITOR
C. W. WHITE (Maxwell Laboratories, Inc.) and P. S. HOFFMAN (Maxwell Laboratories, Inc.)
Apr. 1985 See Also NASA CR-168035(N83-27127/NSP)
LEW-14034 **Vol. 8, No. 4, P. 445**

Capacitor increases efficiency of high-frequency circuits. High-power-capacitor design uses split foil and floating foil plus multiple coils to reduce voltage drop across film and increases lifetime (10 years). Capacitor reliably operates at high frequency in environments normally not hospitable to electronic components.

B84-10226
STABLE OPTOCOUPLER
D. J. GRIFFIN (Perkin-Elmer Corporation)
Apr. 1985
MFS-25927 **Vol. 8, No. 4, P. 446**

Circuit stabilizes current-transfer ratio (CTR) of optically coupled isolator used as linear transducer. New circuit employs feedback circuit containing second optocoupler. Circuit is inexpensive, requires little additional hardware.

B84-10227
REVERSING OPTICAL DAMAGE IN LINBO3 SWITCHES
C. M. GEE (Hughes Aircraft Co.) and G. D. THURMOND (Hughes Aircraft Co.)
Apr. 1985
NPO-16239 **Vol. 8, No. 4, P. 447**

One symptom of optical damage in Ti-diffused LiNbO3 directional-coupler switch reversed by temporarily raising input illumination to higher-thannormal power level. Healing phenomenon used to restore normal operation, increase operating-power rating, and stabilize operating characteristics at lower powers. Higher operating power is tolerated after treatment.

B84-10228
REAL-TIME REED-SOLOMON DECODER
C. R. LAHMEYER (CALTECH)
Apr. 1985
NPO-15982 **Vol. 8, No. 4, P. 448**

RS decoder uses dedicated hardware and data pipelining for high-speed operation. Parallel processing techniques provide equivalent of over one billion operations per second at one step in decoding. Decoder finds commercial application in data encoding/decoding, telemetry, and radio communications.

B84-10229
ADVANCED DC-TRACTION-MOTOR CONTROL SYSTEM
O. VITTONE (Centro Ricerche Fiat S.p.A.)
Apr. 1985
NPO-16118 **Vol. 8, No.4, P. 449**

Motor-control concept for battery-powered vehicles includes stateof-the-art power-transistor switching and separate excitation of motor windings in traction and regenerative braking. Switching transistors and other components of power-conditioning subsystem operate under control of computer that coordinates traction, braking, and protective functions.

B84-10230
INTEGRATED LASER AND LIGHT DETECTOR
J. KATZ (CALTECH), J. R. LESH (CALTECH), and R. M. DICKINSON (CALTECH)
Apr. 1985
NPO-15943 **Vol. 8, No. 4, P. 450**

Proposed infrared optical transmitter tracks distant beacon and automatically point transmitted beam toward beacon. Essential transmitter is integrated gallium arsenide device containing electronically-steerable semiconductor injection laser and position detector that senses direction to beacon. With satisfactory optics and sufficient power, system used for long-distance transmission.

B84-10231
DIFFERENTIAL-COIL EDDY-CURRENT MATERIAL SORTER
J. NUMMELIN (Rockwell International Corp.) and D. BUCKLEY (Rockwell International Corp.)
Apr. 1985
MFS-19872 **Vol. 8, No. 4, P. 451**

Small metal or other electrically conductive parts of same shape but different composition quickly sorted with differential-coil eddy-current sorter. Developed to distinguish between turbine blades of different alloys, hardnesses, and residual stress, sorter generally applicable to parts of simple and complex shape.

B84-10232
HIGH-CYCLE-LIFE LITHIUM CELL
S. P. S. YEN (CALTECH), B. CARTER (CALTECH), D. SHEN (CALTECH), and R. SOMOANO (CALTECH)
Apr. 1985
NPO-15921 **Vol. 8, No. 4, P. 451**

Lithium-anode electrochemical cell offers increased number of charge/ discharge cycles. Cell uses components selected for compatibility with electrolyte solvent: These materials are wettable and chemically stable. Low vapor pressure and high electrochemical stability of solvent improve cell packaging, handling, and safety. Cell operates at modest temperatures less than 100 degrees C - and is well suited to automotive, communications, and other applications.

B84-10233
DISCRIMINATOR AIDS PHASE-LOCK ACQUISITION
L. M. CARSON (Motorola, Inc.) and F. E. KRASIN (Motorola, Inc.)
Apr. 1985
NPO-14311 **Vol. 8, No. 4, P. 453**

Voltage-controlled oscillator in suppressed-carrier detector acquire carrier frequency and phase quickly with help of frequency-discriminator arrangement. To obtain discriminator function, filter bandwidth in quadrature (Q) leg of detector is widened with respect to bandwidth of filter in inphase (I) leg.

B84-10234
LIGHT-ACTIVATED MICROWAVE DEVICE
J. MASERJIAN (CALTECH)
Apr. 1985
NPO-16112 **Vol. 8, No. 4, P. 453**

Laser-activated microwave semiconductor device switches at microwave speeds, generates pulses, or detects optical pulses with fast response. Device consists essentially of back-to-back metal/thin oxide/silicon (MTOS) capacitors on silicon chip.

B84-10235
MAGIC-T-COUPLED MAGNETRONS
R. M. DICKINSON (CALTECH)
Apr. 1985
NPO-15061 **Vol. 8, No. 4, P. 454**

Outputs of two magnetrons added coherently in scheme based on resonant waveguide coupling and injection phase locking. In addition, filaments are turned off after starting. Overall effect is relatively-inexpensive, lowpower, noisy magnetrons generate clean carrier signals of higher power that ordinarily require more expensive klystrons.

B84-10236
LIGHTWEIGHT REGULATED POWER SUPPLY
C. W. MCLYMAN (CALTECH)
Apr. 1985
NPO-15977 **Vol. 8, No. 4, P. 455**

Power-supply circuit regulates output voltage by adjusting frequency of chopper circuit according to variations. Currently installed in battery charger for electric wheelchair, circuit is well suited to other uses in which light weight is important - for example, in portable computers, radios, and test instruments.

B84-10237
ANTENNA SUBREFLECTOR FED BY A LINE SOURCE
A. C. BROWN JR. (Goodyear Aerospace Corp.) and G. D. BRUNNER (Goodyear Aerospace Corp.)
Apr. 1985
MSC-20626 **Vol. 8, No. 4, P. 456**

Additional antenna design options made available by subreflector concept for converting cylindrical waves into spherical waves. Waves used to feed main reflector that shapes radiation pattern into pencil beam for point-to-point communication or into fan beam for aircraft tracking, space surveillance, or directional beacon transmission.

B84-10238
ELLIPSOIDAL BALLOON ANTENNA
P. W. CRAMER (CALTECH)
Apr. 1985
NPO-15931 **Vol. 8, No. 4, P. 457**

Direct-broadcast ellipsoidal antenna 40 percent smaller than spherical reflector. Balloon antenna has feedpoint on surface of ellipsoid outside balloon, simplifying balloon deployment and feed support. Dielectric shrouds used locally to adjust shape of balloon and maintain feed distance at its optimum value.

B84-10239
EFFICIENT REFLECTOR ANTENNA
D. A. BATHKER (CALTECH), A. G. CHA (CALTECH), V. GALINDO (CALTECH), and H. F. REILLY (CALTECH)
Apr. 1985
NPO-16262 **Vol. 8, No. 4, P. 458**

Efficient antenna applicable to systems where main reflector diameter is at least 500 wavelengths. Design provides 2-to-3-dB improvement in gain divided by noise temperature (G/T) over centerline symmetric designs. Performance improvement largely due to clear-aperture, off-axis dual-reflector design.

B84-10240
MEASURING THE CONTACT RESISTANCES OF PHOTOVOLTAIC CELLS
D. R. BURGER (CALTECH)
Apr. 1985
NPO-16168 **Vol. 8, No. 4, P. 459**

Simple method devised to measure contact resistances of photovoltaic solar cells. Method uses readily available equipment and applicable at any time during life of cell. Enables evaluation of cell contact resistance, contact-end resistance, contact resistivity, sheet resistivity, and sheet resistivity under contact.

B84-10241
ESTIMATION OF GROUNDING-STRAP RESISTANCES
R. Q. JACKSON (Rockwell International Corp.)
Apr. 1985
MSC-20694 **Vol. 8, No. 4, P. 460**

Two formulas and set of tabulated values used for calculations of resistances of electrical grounding straps. Tabulated values take into account resistances of terminal crimps as well as resistance of straps alone. Equations apply to thin metal strips, woven braids, and stranded jumpers.

B84-10242
MEASURING AIR-IONIZER OUTPUT
J. O. LONBORG (CALTECH)
Apr. 1985
NPO-16058 **Vol. 8, No. 4, P. 461**

Test apparatus checks ion content of airstream from commercial air ionizer. Apparatus ensures ion output is sufficient to neutralize static charges in electronic assembly areas and concentrations of positive and negative ions are balanced.

B84-10243
GUARD FOR FUSE CAPS
D. C. ATWELL (McDonnell Douglas Corp.)
Apr. 1985
KSC-11283 **Vol. 8, No. 4, P. 461**

L-shaped guard attached to fuse holder. Guard prevents casual tampering with fuses in electrical junction box or fuse block. Protects fuses from being damaged by handling or by rope or string used to secure them. With fuse-cap guard, only responsible people have access to fuses.

B84-10244
BATTERIES FOR ELECTRIC VEHICLES
R. A. CONOVER (CALTECH)
Apr. 1985

NPO-15142 **Vol. 8, No. 4, P. 462**

Report summarizes results of test on 'near-term' electrochemical batteries - (batteries approaching commercial production). Nickel/iron, nickel/zinc, and advanced lead/acid batteries included in tests and compared with conventional lead/acid batteries. Batteries operated in electric vehicles at constant speed and repetitive schedule of accerlerating, coasting, and braking.

B84-10245
THEORETICAL INVESTIGATION OF DIELECTRIC HORN ANTENNAS
J. K. RAINES (Raines Engineering)
Apr. 1985
GSC-12876 **Vol. 8, No. 4, P. 462**

Mathematical model applicable to both solid and hollow dielectric horn antennas implemented in computer program. Conventional hollow metal horns have several disadvantages: difficult to fabricate at short wavelenghts and conducting properties of metal tend to deteriorate with increasing frequency. Dielectric horns offer advantages over conventional metal horns. Computer program permits user to investigate potential of various dielectric antenna designs.

B84-10246
REDUCING STEPPING-MOTOR POWER CONSUMPTION
C. J. WILLIAMS (The Perkin Elmer Corporation)
Apr. 1985
MFS-25119 **Vol. 8, No. 4, P. 463**

Direct-current stepping motors used in computer peripherals, process control, and precision remote-positioning equipment constantly dissipate power and create heat even when not moving. Circuit design energizes stepper motor only when pulses are present on control input.

B84-10247
DETECTING THE POLARITY OF LIGHTNING STRIKES
R. L. GRUMM (CALTECH)
Apr. 1985
NPO-16063 **Vol. 8, No. 4, P. 463**

Recording technique using audio tape recorder determines polarity of lightning discharges. Information important in design of lightning-protection equipment for powerlines and other exposed systems.

B84-10248
CALCULATING STRAIN RELIEF IN ELECTRONIC-COMPONENT LEADS
H. SNYTSHEUVEL (TRW, Inc.)
Apr. 1985
MSC-20416 **Vol. 8, No. 4, P. 463**

Stress/strain formulas applicable to design of electronic-component leads compiled in report. Such things as factors of safety and whether or not lead is likely to fail in service determined in advance. Set of formulas is simple enough to be solved on programable hand-held calculator.

B84-10249
TEMPERATURE COMPENSATION FOR A FREQUENCY-MODULATED OSCILLATOR
R. H. HESSE (TRW, Inc.)
Apr. 1985
MSC-20556 **Vol. 8, No. 4, P. 463**

Carrier frequency and deviation ratio of frequency-modulated oscillator maintained nearly constant by temperature-compensating circuit.

B84-10250
SOLID-STATE LATCHING RELAY
C. W. MCLYMAN (CALTECH)
Apr. 1985
NPO-15028 **Vol. 8, No. 4, P. 464**

Latching relay requiring only single coil activated by trigger pulse and remains latched for timed interval during which it is immune to additional trigger pulses and noise.

B84-10251
PULSED-CURRENT TRANSDUCERS
S. S. NAGANO (CALTECH)
Apr. 1985
NPO-14048 **Vol. 8, No. 4, P. 464**

Diode circuit linearizes output of pulsating dc tranducers. Circuit consists of diode in series with sensing resistor placed across secondary winding of transducer transformer.

B84-10252
PLATINUM-RESISTOR DIFFERENTIAL TEMPERATURE SENSOR
R. B. KOLBLY (CALTECH) and M. J. BRITCLIFFE (CALTECH)
Apr. 1985
NPO-15666 **Vol. 8, No. 4, P. 464**

Platinum resistance elements used in bridge circuit for measuring temperature difference between two flowing liquids. Temperature errors with circuit are less than 0.01 degrees C over range of 100 degrees C.

B84-10253
DETERMINING THE LIFE EXPECTANCY OF PHOTOVOLTAIC SYSTEMS
A. R. HOFFMAN (CALTECH), J. S. GRIFFITH (CALTECH), and P. JAFFE (CALTECH)
Apr. 1985
NPO-15683 **Vol. 8, No. 4, P. 464**

Several tests used to determine adequacy of photovoltaic systems, their modules, and materials to survive in real environments. Tests include outdoor testing of systems, real-time and accelerated outdoor testing of modules and materials, and laboratory testing of modules and materials.

B84-10254
IMPROVED OPTICAL KEYBOARD
R. S. JAMIESON (CALTECH)
Apr. 1985
NPO-15132 **Vol. 8, No. 4, P. 464**

Optical keyboard surfaces used in typewriters, computer terminals, and telephone inexpensively fabricated using stack of printed-circuit cards set in laminate. Internal laminations carry all illuminating and sensing light conductors to keys.

B84-10255
HALL-EFFECT GROUND-FAULT INTERRUPTOR
L. OKIN (Underwriters Laboratories, Inc.)
Apr. 1985
NPO-15915 **Vol. 8, No. 4, P. 464**

Tested ground-fault interruption circuit utilizing Hall-effect device to sense differential current in magnetic core tips and opens circuit.

02 ELECTRONIC SYSTEMS

B84-10026
FAST DUAL ANALOG-TO-DIGITAL CONVERTER
D. E. WALLIS (CALTECH) and R. R. GREEN (CALTECH)
Jan. 1985
NPO-15006 **Vol. 8, No. 3, P. 329**

Unit delivers blocks of quadrature data to computer memory. Contains 105 integrated circuit packages in 19 by 3 1/2 inch (48.26 by 8.39 cm) rack mounted drawer with internal force air blower. Intended for synchronous sampling of quadrature pairs of data, samples with minimal skew (about 10 nanoseconds) using video-type high-speed sampling technology. Unit equipped for computer controlled

self-testing. Originally developed for planetary radar data-acquisition system.

B84-10027
WIRE-IDENTIFICATION INSTRUMENT
J. O. LONBORG (CALTECH)
Jan. 1985
NPO-15633 **Vol. 8, No. 3, P. 330**
Instrument automatically tests each wire in multiwire cable and identifies specified wire to be segregated or labeled and locates wire connected to specified connector pin. Instrument made with readily available CMOS integrated circuits. More efficient and reliable than conventional continuity testers and less expensive than computer controlled units.

B84-10028
AUTOMATIC MONITORING OF SWITCHING POWER SUPPLIES
R. L. MOSER (Martin Marietta Corp.)
Jan. 1985
MFS-25968 **Vol. 8, No. 3, P. 351**
Fast analysis of switching waveforms allows detection of impending failures. Switching power conditioner converts dc power from source such as battery or solar cell array to well regulated dc at convenient voltages and currents. Concept originally developed for space stations and spacecraft also suitable for power conditioning equipment in aircraft and in terrestrial photovoltaic power systems.

B84-10029
INTERCOMPUTER COMMUNICATION LINK
W. A. LUSHBAUGH (CALTECH) and J. W. LAYLAND (CALTECH)
Jan. 1985
NPO-13446 **Vol. 8, No. 3, P. 331**
Interface units transmit, receive, and perform 'handshaking' functions. Two computers communicate over distance up to 6700 meters at average transmission speeds around 200 kilobaud with help of pair of programable interface units. Interfaces use form of pulse modulation and are programed for full 'handshaking' capabilities.

B84-10030
OPTICAL QUANTUM RECEIVER FOR BINARY SIGNALS
V. A. VILNROTTER (CALTECH)
Jan. 1985
NPO-15122 **Vol. 8, No. 3, P. 332**
In quantum optical receiver, both amplitude and phase of received optical signal measured to extract as much information as possible, thereby reducing error probability. Phase-modulated received signal mixed with equal amplitude replica of optical carrier generated in phase locked loop. Two signals interfere with each other at photomultiplier cathode. Probability of error with this scheme close to theoretical minimum and implemented with current technology.

B84-10031
MONITORING PERFORMANCE OF COMPLEX SYSTEMS
W. F. THOMAS
Jan. 1985
KSC-11273 **Vol. 8, No. 3, P. 333**
33-page report describes use of computers in automatic on-line monitoring of Centaur rocket prior to launch. Computers analyze measurements and verify events and commands. System uses adaptive software so only real problems are detected and brought to attention of engineers. Software techniques transferable to such industrial uses as batch process control and production line automation.

B84-10032
REPORT ON SATELLITE RADAR FOR DETECTING OCEAN CURRENTS
A. JAIN (CALTECH)
Jan. 1985
NPO-15704 **Vol. 8, No. 3, P. 333**
Good resolution and high signal/noise ratio anticipated. Report describes orbiting sidelooking radar that measures ocean currents in direction toward or away from it. Radar relies on relationship between Doppler shifts and lengths and frequencies of ocean waves.

B84-10033
COST AND PERFORMANCE OF DISTRIBUTED PHOTOVOLTAIC SYSTEMS
C. S. BORDEN (CALTECH) and M. C. DAVISSON (CALTECH)
Jan. 1985
NPO-16001 **Vol. 8, No. 3, P. 334**
Lifetime Cost and Performance (LCP) model assists in design of Photovoltaic (PV) systems. LCP simulation of performance, cost and revenue streams associated with distributed PV power systems. Provides user with substantial flexibility in specifying technical and economic environment of PV application.

B84-10034
ELECTRIC/HYBRID VEHICLE SIMULATION
R. A. SLUSSER (CALTECH), C. P. CHAPMAN (CALTECH), and J. P. BRENNAND (General Research Corp.)
Jan. 1985
NPO-15229 **Vol. 8, No. 3, P. 334**
ELVEC computer program provides vehicle designer with simulation tool for detailed studies of electric and hybrid vehicle performance and cost. ELVEC simulates performance of user-specified electric or hybrid vehicle under user specified driving schedule profile or operating schedule. ELVEC performs vehicle design and life cycle cost analysis.

B84-10035
LRU VOLTAGE ANALYSIS
T. OEPOMO (Rockwell International Corp.) and T. PROUTY (Rockwell International Corp.)
Jan. 1985
MSC-20699 **Vol. 8, No. 3, P. 335**
Program for analyzing line replacement unit (LRU) voltages in shuttle orbiter predicts minimum voltage level of main power distribution bus needed to meet predetermined LRU voltage. Loads constant-power or resistive. In some cases fed from two or three sources through diodes.

B84-10036
FRONT-END PROGRAM FOR SYSGEN
C. R. CARLSON (CALTECH) and M. DAVISSON (CALTECH)
Jan. 1985
NPO-15782 **Vol. 8, No. 3, P. 335**
SYSGEN, Power Generation System Production costing and Reliability Analysis program, simulates production costs and reliability of electric utility with and without time-dependent generating units. FEPS transforms inputs into proper formats, builds data files and adds Job Control Language necessary to running SYSGEN program.

B84-10037
MULTIPLE-USER ADAPTIVE-ARRAY COMMUNICATION SYSTEM
S. ZOHAR (CALTECH)
Jan. 1985
NPO-15765 **Vol. 8, No. 3, P. 335**
Weights for K-beam system computed K/6 times faster. In single-frequency adaptive-array communication system in whick K mobile users communicate with central station equipped with n-antenna array. Each K signal recoverable by taking specific weighted sum of n complex antenna voltages.

B84-10038
CAPACITOR-TEST SYSTEM
F. M. OTT (CALTECH) and R. A. SUMMERS (CALTECH)
Jan. 1985
NPO-16485 **Vol. 8, No. 3, P. 336**

Polycarbonate film capacitors tested for leakage paths with microprocessor controlled multiplexer test sequence. Microprocessor based capacitor test system simultaneously monitors 80 capacitors.

B84-10039
IMPROVED ULTRASONIC RESOLUTION VIA ANALOG TECHNIQUE
P. M. GAMMELL (CALTECH)
Jan. 1985
NPO-15707 **Vol. 8, No. 3, P. 336**
High spatial resolution obtained from reflected or transmitted ultrasonic pulses by analog technique that produces signal proportional to magnitude of complex plane analytic representation of signal.

B84-10040
REMOVING DRIFT FROM FREQUENCY-STABILITY MEASUREMENTS
C. A. GREENHALL
Jan. 1985
NPO-15833 **Vol. 8, No. 3, P. 336**
Method for eliminating frequency drifts from frequency stability measurements produces more accurate indication of stability of such frequency standard as hydrogen maser.

B84-10041
REMOTE-IMAGING PARAMETERS
R. F. RICE (CALTECH)
Jan. 1985
NPO-14869 **Vol. 8, No. 3, P. 336**
Image resolution, image quality and data transmission rate of remote imaging systems continuously controlled by operator intervention. Set of levers allows operator to control independently frame rate, frame size and image quality in bits per pixel. System used for imaging systems in aircraft or remotely piloted vehicles.

B84-10042
PROGRAMABLE MULTICRATE CONTROLLER
G. L. MOOK (McDonnell Douglas Corp.) and M. R. PHILLIPS (McDonnell Douglas Corp.)
Jan. 1985
MFS-25533 **Vol. 8, No. 3, P. 336**
High-speed, environmentally hardened controller developed for use with commercially available system crates for both experiment control and data handling. Programable crate controller consists of three functional areas: control section utilizes high-speed bit-slice circuitry, memory, and data way interface.

B84-10043
EYE-MOVEMENT TRACKER WOULD REDUCE VIDEO BANDWIDTH
C. F. RUOFF (CALTECH)
Jan. 1985
NPO-15432 **Vol. 8, No. 3, P. 337**
Bandwidth required to transmit closed circuit television image reduced by transmitting small portion at high resolution and remainder at low resolution. High-resolution portion centered in viewer's gaze so entire image seems to be of high resolution.

B84-10044
ELIMINATING FALSE SIGNALS FROM ELECTROMECHANICAL KEYBOARDS
C. F. SCHOTT (Rockwell International Corp.)
Jan. 1985
MSC-20429 **Vol. 8, No. 3, P. 337**
Contact switches in electromechanical keyboards prone to 'bounce' creation of unwanted pulses that interfere with digital systems. New adapter unit eliminates bounce without separate power supply.

B84-10045
LOW-FREQUENCY NAVIGATIONAL SYSTEM
D. E. WALLIS (CALTECH)
Jan. 1985
NPO-15264 **Vol. 8, No. 3, P. 337**
Accurate vehicle position determination over 50 by 50-km service area accomplished by low-frequency-radio navigational system comprised of four frequency/phase comparison transmitters and receivers. Use of grid-calibration table permits accurate position determination in vehicle receiver system.

B84-10046
TRANSFER-FUNCTION SIMULATOR
M. J. KAVAYA (CALTECH)
Jan. 1985
NPO-15696 **Vol. 8, No. 3, P. 337**
Transfer function simulator constructed from analog or both analog and digital components substitute for device that has faults that confound analysis of feedback control loop. Simulator is substitute for laser and spectrophone.

B84-10047
OPTICAL MASS MEMORY SYSTEM SPECIFICATION
Innovator Not Given (Harris Corp.) Jan. 1985
MFS-25592 **Vol. 8, No. 3, P. 337**
Specifications given for computer controlled optical mass memory system that stores and retrieves data from silver halide fiches 148-mm square and 7 mils (0.18mm) thick at user bit density of 30 Mbit/in. 2 (4.7 Mbit/cm2) with uncorrectable bit-error rate of 10 to negative 9th power or less. Allows for expansion to 10 the 15th power bit capacity.

B84-10048
REED-SOLOMON ENCODER
T. K. TROUNG (CALTECH), I. S. REED (CALTECH), L. J. DEUTSCH (CALTECH), I. S. HSU (CALTECH), K. WANG (CALTECH), and C. S. YEH (CALTECH)
Jan. 1985
NPO-16074 **Vol. 8, No. 3, P. 337**
Report presents mathematical principles of Berlekamp bit serial multiplier algorithm and its application to design of very-large-scale integrated (VLSI) encoders for Reed-Solomon error-correcting codes. Structure made readily on single chip of negatively doped channel metal oxide semiconductor.

B84-10049
NORMALIZING VFO FREQUENCY BY NON-POWR-OF-2 DIVISION
C. R. ANDERSON (Odetics, Inc.)
Jan. 1985
NPO-15330 **Vol. 8, No. 3, P. 338**
PLL oscillator with VFO operating at one frequency yields any one of four frequencies by dividing by 4, 7, 21, or 52.5. Radiation resistant phase-locked loop oscillator generates output frequency 32 times any 1 or 4 specific input reference frequencies constructed without increasing component count over that of conventional circuit.

B84-10256
DIRECT-PHOTON-DETECTION COMMUNICATIONS
J. R. LESH (CALTECH) and J. KATZ (CALTECH)
Apr. 1985
NPO-15905 **Vol. 8, No. 4, P. 467**
Optical communications system based on direct detection of photons rather than heterodyning of carrier with local oscillator. Direct-detection system uses single laser source, pulse-position modulation, and Reed-Solomon coding to protect against burst errors. Conventional photomultiplier tube is receiver. Technology applicable to terrestrial communications.

B84-10257
ESTIMATES OF SMALL SIGNAL/NOISE RATIOS
L. D. HOWARD (CALTECH)
Apr. 1985
NPO-15653 **Vol. 8, No. 4, P. 468**

Signal/Noise Ratio Meter measures ratio of signal power to noise power in input that contains both signal and noise. Signal and noise first filtered and normalized in analog circuitry, then digitized and sampled. Performance of SNR meter determined by statistical algorithm chosen for analysis of samples.

B84-10258
PROXIMITY INDICATOR FOR REMOTE MANIPULATOR
A. K. BEJCZY (CALTECH)
Apr. 1985
NPO-15064 **Vol. 8, No. 4, P. 468**

Display indicates pitch, yaw, and distance of remote manipulator with respect to object to be grasped. Displays numerical values and bargraph simulation of position and orientation of hand. When errors in position and orientation are small enough to ensure successful grasp, unit alerts operator with audible and visible signals.

B84-10259
CONTROLLING SOLAR-POWER SYSTEMS WITH DISTRIBUTED PROCESSORS
M. S. IMAMURA (Martin Marietta Corp.) and R. L. MOSER (Martin Marietta Corp.)
Apr. 1985
NPO-15101 **Vol. 8, No. 4, P. 469**

System undergoing development uses distributed microprocessors to monitor and control photovoltaic power system. Equipment increases life expectancy and reliability of power system and decreases costs. Adapted to vehicular, residential, and commercial solar and nonsolar power systems. Equipment especially desirable in systems with overall power levels above few kilowatts.

B84-10260
MEASURING TRACKING ACCURACY OF CCD IMAGERS
R. H. STANTON (CALTECH) and E. W. DENNISON (CALTECH)
Apr. 1985
NPO-15665 **Vol. 8, No. 4, P. 470**

Tracking accuracy and resolution of charge-coupled device (CCD) imaging arrays measured by instrument originally developed for measuring performance of star-tracking telescope. Operates by projecting one or more artificial star images on surface of CCD array, moving stars in controlled patterns, and comparing star locations computed from CCD outputs with those calculated from step coordinates of micropositioner.

B84-10261
PRIORITY QUEUING ON A PARALLEL DATA BUS
D. E. WALLIS (CALTECH)
Apr. 1985
NPO-15005 **Vol. 8, No. 4, P. 471**

Queuing strategy for communications along shared data bus minimizes number of data lines while always assuring user of highest priority given access to bus. New system handles up to 32 user demands on 17 data lines that previously serviced only 17 demands.

B84-10262
TARGET SIMULATOR FOR SYNTHETIC-APERTURE RADARS
H. A. ZEBKER (CALTECH), D. N. HELD (CALTECH), R. M. GOLDSTEIN (CALTECH), and T. C. BICKLER (CALTECH)
Apr. 1985
NPO-15024 **Vol. 8, No. 4, P. 471**

In proposed Target Simulator for Testing Synthetic-Aperture Radars, radar transmitter output received, mixed down to video frequencies, and passed through variable digital delay. Delayed signal mixed up to original carrier frequency and transmitted back to radar. Synthetic-aperture radar (SAR) generates return signal that contains range-curvature information in addition to Doppler-frequency information.

B84-10263
SYNCHRONIZED RADAR-TARGET SIMULATOR
B. C. CHIN (Hughes Aircraft Co.)
Apr. 1985
MSC-20240 **Vol. 8, No. 4, P. 472**

Apparatus for testing radar system generates signals that simulate amplitude and phase characteristics of target returns and their variation with antenna-pointing direction. Antenna movement causes equipment to alter test signal in imitation of behavior of real signal received during tracking.

B84-10264
ESTIMATING DOPPLER SHIFTS FOR SYNTHETIC-APERTURE RADAR
J. C. CURLANDER (CALTECH)
Apr. 1985
NPO-15990 **Vol. 8, No. 4, P. 473**

Quality of synthetic-aperture-radar (SAR) imagery enhanced by pair of signal-processing techniques that compensate for relative motion between target and vehicle. Combining vehicle trajectory data with radar-parameter and raw image data, techniques generate Doppler estimates for use in constructing fully processed images.

B84-10265
CONTOUR-MAPPING SYNTHETIC-APERTURE RADAR
R. M. GOLDSTEIN (CALTECH), E. R. CARO (CALTECH), and C. WU (CALTECH)
Apr. 1985
NPO-15939 **Vol. 8, No. 4, P. 474**

Airborne two-antenna synthetic-aperture-radar (SAR) interferometric system provides data processed to yield terrain elevation as well as reflectedintensity information. Relative altitudes of terrain points measured to within error of approximately 25 m.

B84-10266
FIBER-OPTIC EQUIPMENT FOR POWER-SYSTEM CONTROL
A. O. BRIDGEFORTH (CALTECH) and L. C. YANG (CALTECH)
Apr. 1985
NPO-15968 **Vol. 8, No. 4, P. 476**

Report surveys state of art in fiber optics and explores use of microprocessors communicating over optical fibers to control complicated power system with many producing and consuming units. Power system of study is of planetary spacecraft, and fiber-optic technology extension of that now under development or used in military aircraft and ships.

B84-10267
CONVOLUTIONALLY-CODED UNBALANCED QPSK SYSTEMS
D. DIVSALAR (CALTECH) and J. H. YUEN (CALTECH)
Apr. 1985
NPO-15566 **Vol. 8, No. 4, P. 476**

Report discusses error-rate performance for three convolutionally coded unbalanced quadriphase-shift-keying (UQPSK) communication systems with noisy carriers that introduce crosstalk. Systems analyzed unbalanced in sense that each transmits two data streams with different bit rates and (in some cases) different powers.

B84-10268
INTERACTIVE DIGITAL SIGNAL PROCESSOR
W. H. MISH
Apr. 1985
GSC-12862 **Vol. 8, No. 4, P. 477**

Interactive Digital Signal Processor, IDSP, consists of set of time series analysis 'operators' based on various algorithms commonly used for digital signal analysis. Processing of digital signal time series to extract information usually achieved by applications of number of fairly standard operations. IDSP excellent teaching tool for demonstrating application for time series operators to artificially generated signals.

B84-10269
SHORT-RANGE DIGITAL OPTICAL LINKS
R. M. DICKINSON (CALTECH)
Apr. 1985
NPO-15999 **Vol. 8, No. 4, P. 477**
Concept based on multiple optoelectronic chips. Proposed network of semiconductor lasers used for communication and radar. Network includes small integrated transmitters, receivers, and data processors placed at strategic points on station and vehicles.

B84-10270
COMMUNICATION PROGRAM EMULATES SWITCHBOARD
D. RON (Rockwell International Corp.)
Apr. 1985
MFS-19917 **Vol. 8, No. 4, P. 477**
Software allows microprocessor systems to communicate with external devices. Flexible program completely menu-driven, and all local operator commands require only single keystroke.

B84-10271
DIGITAL RATIOMETER
R. BEER
Apr. 1985
NPO-15396 **Vol. 8, No. 4, P. 477**
Small, low-cost comparator with 24-bit-precision yields ratio signal from pair of analog or digital input signals. Arithmetic logic chips (bit-slice) sample two 24-bit analog-to-digital converters approximately once every millisecond and accumulate them in two 24-bit registers. Approach readily modified to arbitrary precision.

B84-10272
BISTATIC SYNTHETIC-APERTURE RADAR
C. ELACHI (CALTECH), R. GOLDSTEIN (CALTECH), and D. HELD (CALTECH)
Apr. 1985
NPO-15619 **Vol. 8, No. 4, P. 478**
Report describes synthetic-aperture radar that uses spaceborne transmitter and ground (or airborne) receiver to obtain imaging data in real time. System has applications in vessel navigation in open seas and polar ice regions, monitoring of wave and ice patterns near shores and oil platforms, and continuous monitoring of region with repeat time of few hours or less.

B84-10273
IMAGING SYSTEM FOR HIGH-TEMPERATURE PROCESSES
T. A. GLAVICH (CALTECH)
Apr. 1985
NPO-15945 **Vol. 8, No. 4, P. 478**
Borescope/camera arrangement used for viewing silhouette image of specimen levitated inside furnance. System adapted for monitoring other processes in enclosures.

B84-10274
QUICKER SELECTION OF CCD IMAGES
P. M. SALOMON (CALTECH) and K. SMILOWITZ (CALTECH)
Apr. 1985
NPO-15345 **Vol. 8, No. 4, P. 478**
Microprocessor limits analog-to-digital conversion to image areas of interest. Image region of interest selected in order of brightness by use of threshold detectors and their coordinates stored by microprocessor for tracking.

B84-10275
HIGH-RESOLUTION CHARGE-COUPLED-DEVICE CAMERA
M. C. CLARY (CALTECH), K. P. KLAASEN (CALTECH), L. M. SNYDER (CALTECH), and P. K. WANG (CALTECH)
Apr. 1985
NPO-15086 **Vol. 8, No. 4, P. 478**
800-by-800-element sensor and lens of 1.5-m focal length used in camera with 0.01-mrad resolution.

B84-10276
PACKET TELEMETRY AND PACKET TELECOMMAND
A. J. HOOKE (CALTECH) and E. GREENBERG (CALTECH)
Apr. 1985
NPO-16301 **Vol. 8, No. 4, P. 478**
Two communication protocols for telemetry and telecommand reduce amount of required hardware and software and facilitate bidirectional information exchange.

03 PHYSICAL SCIENCES

B84-10050
INTERFEROMETER MEASURES BROADBAND SURFACE ACOUSTIC WAVES
R. O. CLAUS (Virginia Polytechnic Institute and State University) and T. TURNER (Virginia Polytechnic Institute and State University)
Jan. 1985
LAR-12966 **Vol. 8, No. 3, P. 341**
Dual differential interferometer uses two pairs of orthogonallypolarized optical beams to measure amplitude and orientation of broadband ultrasonic surface acoustic waves. Instrument modular, and sensitivity limited only by optical detector used.

B84-10051
ACOUSTIC GAUSSIAN FAR-FIELD PATTERN
R. O. CLAUS (Virginia Polytechnic Institute and State University) and P. S. ZERWEKH (Virginia Polytechnic Institute and State University)
Jan. 1985
LAR-12967 **Vol. 8, No. 3, P. 342**
Gaussian profile achieved by using annular electrodes. Transducer constructed by deposting circularly symmetric metallic multielectrode array on 12.7 mm diameter X-cut quartz disk. Each electrode independently connected to impedance network optimized to produce Gaussian distribution with less than 2 percent error. Ultrasonic transducer produces far field beam with Gaussian spatial profile for materials evaluation applications.

B84-10052
RECEIVER FOR SOLAR AIR TURBINE
A. KOFAL (The Boeing Co.), R. SHANNON (The Boeing Co.), and D. K. ZIMMERMAN (The Boeing Co.)
Jan. 1985
NPO-15124 **Vol. 8, No. 3, P. 343**
Solar receiver heats air to temperature high enough to drive gas turbine. Receiver has thermal output of about 70 kilowatts. Pointing downward at focal position of solar reflector, proposed receiver accepts intense concentrated sunlight. Although temperatures in receiver may rise to 1,500 degrees F (816 degrees C) or more, calculations show receiver loses less that 10 percent of insolation by convection through aperture. Receiver designed for 30-year life without scheduled maintenance or replacement.

B84-10053
ANGLE-MEASUREMENT AND RANGING SYSTEM
J. C. TIETZ (Martin Marietta Corp.)
Jan. 1985
MFS-25912 **Vol. 8, No. 3, P. 344**
Optical system automatically supplies information on

angular position and range of object. Stereo rangefinder video signals from cameras processed to determine center of brightness for images of beacon on target vehicle. Range updated by onboard computer. Originally developed for spacecraft rendezvous and guidance, features of system adapted to angle-measurement and ranging problems on Earth. Technique also used for tool alinement inspections and color recognition.

B84-10054
ZERO-NET-CHARGE AIR IONIZER
W. R. WOODS JR. (CALTECH)
Jan. 1985
NPO-15937 **Vol. 8, No. 3, P. 345**

Instrument monitors air supplied by air ionizer and regulates ionizer to ensure net charge neutral. High-impedance electrometer and nulling control amplifier regulate output of air ionizer. Primarily intended to furnish ionized air having no net charge, instrument adaptable to generating air with positive or negative net charge is so desired. Useful where integrated circuit chips are manufactured, inspected, tested or assembled.

B84-10055
CONVECTIVE OSCILLATIONS AT CRYSTAL/MELT INTERFACE
M. GLICKSMAN (Rensselaer Polytechnic Institute), S. CORIELL (National Bureau of Standards), and R. BOISVERT (National Bureau of Standards)
Jan. 1985
MFS-25892 **Vol. 8, No. 3, P. 345**

Oscillatory instability in shape of solid/liquid interface geometry observed in heat-transfer experiments in long, thin vertical cylinder filled with succinonitrile. Novel fluid flow configuration with cylindrical symmetry developed to permit detailed heat flow experiments in geometry also mathematically tractable.

B84-10056
ASSESSING ENERGY-GENERATING SYSTEMS
R. G. CHAMBERLAIN (CALTECH), K. M. MCMASTER (CALTECH), and M. C. DAVISSON (CALTECH)
Jan. 1985
NPO-16159 **Vol. 8, No. 3, P. 346**

Economics of user specified thermal and electrical systems analyzed. OMEGA finds normative prices and break-even values of system parameters. Applies to electrical and thermal energy generation systems owned by utility, business or consumer.

B84-10057
A GENERAL OPTICAL SYSTEMS EVALUATION PROGRAM
M. WILSON and B. HOWELL
Jan. 1985
GSC-12823 **Vol. 8, No. 3, P. 346**

General Optical Systems Evaluation Program, GENOPTICS, aids analysis and evaluation of optical systems that employ lenses, mirrors, diffraction gratings and other geometrical surfaces. GENOPTICS uses geometrical ray tracing based on Snell's law.

B84-10058
SOLAR/THERMAL POWERPLANT SIMULATION
J. M. BOWYER (CALTECH), N. EL GABALAWI (CALTECH), G. M. HILL (CALTECH), and M. L. SLONSKI (CALTECH)
Jan. 1985
NPO-15440 **Vol. 8, No. 3, P. 347**

Simulation program evaluates performances and energy costs of diverse solar/thermal powerplant configurations. Approach based on optimizing sizes of collector and storage subsystems to give minimum energy cost for specified plant rating and load factor. Methodology provides for consistent comparative evaluation of solar/thermal powerplants.

B84-10059
THERMOELECTRIC GENERATOR
T. COLE (CALTECH)
Jan. 1985
NPO-16164 **Vol. 8, No. 3, P. 347**

Small modular alkali metal thermoelectric generator with no moving parts directly converts heat to electrical energy with efficiency of 20 to 40 percent. Unit uses closed regenerative electrochemical concentration cell based on sodium-ion conductor beta alumina.

B84-10060
SOFT-X-RAY PREFILTER FOR HOT, BRIGHT OBJECTS
J. M. DAVIS (American Science & Engineering, Inc.) and J. A. ORTENDAHL (American Science & Engineering, Inc.)
Jan. 1985
NPO-15972 **Vol. 8, No. 3, P. 347**

Prefilters consisting of beryllium foil supported on conductive silver mesh transmit soft x-rays but are nearly opaque to visible and infrared light. New Be/AG filters protect imaging X-ray detectors from damage by visible and longer wavelength radiation when viewing such hot, bright emitters as Sun or possibly certain industrial processes.

B84-10061
FREQUENCY-MODULATION CORRELATION SPECTROMETER
J. S. MARGOLIS (CALTECH) and J. V. MARTONCHIK (CALTECH)
Jan. 1985
NPO-15558 **Vol. 8, No. 3, P. 347**

New type of correlation spectrometer eliminates need to shift between two cells, one empty and one containing reference gas. Electrooptical phase modulator sinusoidally shift frequencies of sample transmission spectrum.

B84-10062
PUMP-FED VERSUS PRESSURE-FED PROPULSION
P. N. ESTEY (CALTECH)
Jan. 1985
NPO-15190 **Vol. 8, No. 3, P. 348**

Pumping system has lower mass. Equations worked out to compare masses of pump and pressure-fed bipropellant propulsion systems. Equations developed specifically for interplanetary spacecraft but technique adaptable to advanced automative energy-storage techniques.

B84-10063
MONITORING OF REACTIVE ATMOSPHERIC SPECIES
C. R. WEBSTER (CALTECH)
Jan. 1985
NPO-15981 **Vol. 8, No. 3, P. 348**

Reactive atmospheric species produced and detected to provide reference spectra. Compact device insensitive to scattered light and has low power consumption.

B84-10064
THERMAL-EXPANSION MEASUREMENT
J. H. DAVIS (University of Alabama) and C. RIVES (University of Alabama)
Jan. 1985
MFS-27000 **Vol. 8, No. 3, P. 348**

Precise stable laser system determines coefficients of thermal expansion. Dual-beam interferometer arrangement monitors changes in sample length as function of temperature by following changes inoptical path lengths.

B84-10065
INTEGRATED SYSTEM FOR ENVIRONMENTAL SIMULATION
R. UDA (Planning Research Corp.), S. DANDAGE (Planning Research Corp.), and D. MACDONALD (Planning Research Corp.)
Jan. 1985
KSC-11274 **Vol. 8, No. 3, P. 348**

Integrated testing system subjects ground-support

equipment for Space Shuttle to conditions that prevail during launch. Concept also applies to testing other equipment that must function faultlessly in difficult environment.

B84-10066
FLEXIBLE MIRROR MOUNT FOR MICHELSON INTERFEROMETER
G. S. PERKINS (CALTECH)
Jan. 1985
NPO-15746 **Vol. 8, No. 3, P. 348**
Interferometer mirrors mounted on flexible spring strips. Mounts used in folded-beam Michelson interferometer designed to monitor pollutants at altitude of 40,000 meters.

B84-10067
ADJUSTABLE-FREQUENCY SPECTROPHONE LASER STABILIZATION
M. J. KAVAYA (CALTECH) and R. T. MENZIES (CALTECH)
Jan. 1985
NPO-15516 **Vol. 8, No. 3, P. 348**
Gas laser frequency stabilizing system includes sensitive spectrophone that senses dither modulation of frequency of laser beam, producing Lorentzian, Voigt, or Doppler spectral tuning response.

B84-10068
EVALUATING SOLAR COLLECTORS
L. C. WEN (CALTECH), P. T. POON (CALTECH), W. J. CARLEY (CALTECH), and L. HUANG (U.S. Navy)
Jan. 1985
NPO-15733 **Vol. 8, No. 3, P. 349**
Survey discusses several methods for assessing performance of solar-concentrator designs to determine whether given design suitable for given high-temperature solar powered generator system.

B84-10069
SOLAR-POWERED WATER DISTILLATION
F. J. MENNINGER (CALTECH) and R. J. ELDER (CALTECH)
Jan. 1985
NPO-15894 **Vol. 8, No. 3, P. 349**
Solar-powered still produces pure water at rate of 6,000 gallons per year. Still fully automatic and gravity-fed. Only outside electric power is timer clock and solenoid-operated valve. Still saves $5,000 yearly in energy costs and pays for itself in 3 1/2 years.

B84-10070
ASSESSING THE PERFORMANCE OF SOLAR ARRAYS
R. G. ROSS JR. (CALTECH) and C. C. GONZALEZ (CALTECH)
Jan. 1985
NPO-15277 **Vol. 8, No. 3, P. 349**
Selected environmental conditions more effective than traditional parameters. Report analyzes selection of reference criteria for comparing performances of photovoltaic arrays.

B84-10071
SOLAR-THERMAL-DESALINATION STUDY
L. D. LEIBOWITZ (CALTECH), T. M. LIU (CALTECH), and H. Q. PHAM (CALTECH)
Jan. 1985
NPO-15795 **Vol. 8, No. 3, P. 349**
Survey assessing economic feasibility of advanced solar-thermal technologies for desalination described in report.

B84-10072
SUPPORT SYSTEM FOR SOLAR RECEIVERS
T. KICENIUK (CALTECH)
Jan. 1985
NPO-15749 **Vol. 8, No 3, P. 349**
Hinged split-ring mounts insure safe support of heavy receivers. In addition to safer operation and damage-free mounting system provides more accurate focusing, and small incremental adjustments of ring more easily made.

B84-10073
TESTING FOR SOLAR-ARRAY HOTSPOTS
C. C. GONZALEZ (CALTECH) and J. C. ARNETT (CALTECH)
Jan. 1985
NPO-15596 **Vol. 8, No. 3, P. 350**
Laboratory procedure developed for evaluting hot-spot endurance of photovoltaic modules under field-service conditions. Procedures used for qualification testing of modules.

B84-10077
REFLECTING SCHMIDT/LITTROW PRISM IMAGING SPECTROMETER
J. B. BRECKINRIDGE (CALTECH), N. A. PAGE (CALTECH), R. V. SHACK (CALTECH), and R. R. SHANNON (CALTECH)
Apr. 1985
NPO-15801 **Vol. 8, No. 4, P. 481**
High resolution achieved with wide field of view. Imaging Spectrometer features off-axis reflecting optics, including reflecting 'slit' that also serves as field flattener. Only refracting element is prism. By scanning slit across object or scene and timing out signal, both spectral and spatial information in scene are obtained.

B84-10278
LASER RANGEFINDER AND REMOTE PROFILOMETER
J. M. MCLAUCHLAN (CALTECH), J. AUYEUNG (CALTECH), E. F. TUBBS (CALTECH), W. G. GOSS (CALTECH), and D. PSALTIS (CALTECH)
Apr. 1985
NPO-15865 **Vol. 8, No. 4, P. 482**
Proposed laser rangefinder and profilometer operates with precision of about 1mm at ranges of up to 100m. With scanning optics, device could track objects or accurately measure shapes of objects in field of view. New microprocessor-controlled design uses variable-length fiber-optic delay line as distance reference. New rangefinding method used in vision systems for industrial robots.

B84-10279
RAPID FREEZING-POINT MEASUREMENT
B. MATHIPRAKASAM (Midwest Research Institute)
Apr. 1985 See Also CR-167981 (N83-10207)
LEW-14019 **Vol. 8, No. 4, P. 483**
Technique developed for rapid determination of freezing-point temperature of fuels. Technique determines freezing point in under 10 minutes and is suitable for use in design of portable device.

B84-10280
DETERMINING THE SLOPE ERROR OF A PARABOLIC REFLECTOR
G. R. CHRIST (AAI Corporation)
Apr. 1985
NPO-15713 **Vol. 8, No. 4, P. 484**
Approximate slope error determined with minimal test equipment. Test Setup for Determining Slope Error for Point-Focusing Dish includes pinhole camera at center of curvature and color-coded target mounted around pinhole. Floodlights illuminate target to minimize exposure time. New procedure provides good approximation of reflector slope error and is excellent tool for comparative analysis of reflectors used as solar collectors for microwave receivers.

B84-10281
INTERFEROMETER FOR MEASURING ACOUSTIC SIGNALS
R. O. CLAUS (Virginia Polytechnic Institute and State University) and A. O. GARG (Virginia Polytechnic Institute and State University)
Apr. 1985

LAR-13030 **Vol. 8, No. 4, P. 484**

Optical-fiber interferometer measures wave amplitude without contacting specimen surface. System contains remote detector head. Head includes beam splitter that divides input beam and recombines output beams, while spatial filter filters interference pattern at beam-splitter output; and lens focuses this on detector. Beams focused on specimen surface to record acoustic signals.

B84-10282
ROOF OVERHANGS FOR SOLAR HOUSES
W. GRACEY
Apr. 1985
LAR-13140 **Vol. 8, No. 4, P. 485**

Convenient graphical method determines both width and vertical position of overhangs for standard wall section having 'typical' window arrangement. Overhangs for this wall section determined for two extremes of latitude in United States.

B84-10283
TELESCOPING SHIELD FOR POINT-FOCUSING SOLAR CONCENTRATORS
M. ARGOUD (CALTECH), W. WALKER (CALTECH), and L. V. BUTLER (CALTECH)
Apr. 1985
NPO-16236 **Vol. 8, No. 4, P. 486**

Telescoping shield normally stowed around solar receiver protects heat engine and supporting structure from overheating when concentrator aimed few degrees away from line to Sun. When extended, shield intercepts off center concentrated solar radiation. Heat spread out over thermally conductive shield and reradiated diffusely not to cause structural damage.

B84-10284
MAXIMUM OUTPUTS OF SOLAR PHOTOVOLTAIC ARRAYS
R. G. ROSS JR. (CALTECH), G. M. HILL (CALTECH), and C. C. GONZALEZ (CALTECH)
1985
NPO-15966 **Vol. 8, No. 4, P. 487**

Report presents electrical data for solar photovoltaic arrays operating at different locations in United States. Data useful in designing power-conditioners for matching output of array to load.

B84-10285
LASER POLLUTANT-MEASURING SYSTEMS
W. B. GRANT (CALTECH) and R. T. MENZIES (CALTECH)
Apr. 1985
NPO-16101 **Vol. 8, No. 4, P. 487**

Laser optical system for remote gas pollutant measurements surveyed. Laser systems discussed in published report, and choices of appropriate gas measuring instruments and their sensitivities evaluated.

B84-10286
RETRIEVAL OF GEOPHYSICAL PARAMETERS FROM RADIOMETRIC DATA
P. C. PANDEY (CALTECH) and R. K. KAKAR (CALTECH)
Apr. 1985
NPO-16266 **Vol. 8, No. 4, P. 487**

Rapid linear algorithm retrieves meteorological parameters from microwave radiometric data. Versatile 2-step, multiple-linear-regression algorithm examines all possible subsets of available channels and selects optimum subset for retrieving given geophysical or meteorological parameter.

B84-10287
INSTRUMENTATION FOR SOLAR-OSCILLATION MEASUREMENTS
E. J. RHODES JR. (CALTECH), T. W. ANDREWS (CALTECH), E. J. SMITH (CALTECH), R. F. HOWARD (Mount Wilson Observatory), and R. K. ULRICH (UCLA)
Apr. 1985
NPO-15687 **Vol. 8, No. 4, P. 488**

System works with any telescope with spectrograph without interfering with existing use of spectrograph. Telescope aiming accuracy is 1 arc-second.

B84-10288
SOLAR-POWER SYSTEM PRODUCES HIGH-PRESSURE STEAM
F. L. LANSING (CALTECH)
Apr. 1985
NPO-15434 **Vol. 8, No. 4, P. 488**

Combination of three multistaged solar collectors produces highpressure steam for large-scale continuously operating turbines for generating mechanical or electrical energy. Superheated water vapor drives turbines, attaining an overall system efficiency about 22 percent.

B84-10289
FRESNEL-LENS/HEAT-STORAGE SYSTEM
R. H. TURNER (CALTECH)
Apr. 1985
NPO-16242 **Vol. 8, No. 4, P. 488**

Self-contained solar-thermal power-plant uses Fresnel lenses to deliver up to 100 kilowatts. Proposed 200-volt system uses about 800 Fresnel lenses.

B84-10290
TEN THOUSAND SOLAR CONSTANTS RADIOMETER
J. M. KENDALL SR. (CALTECH)
Apr. 1985
NPO-15922 **Vol. 8, No. 4, P. 488**

'Radiometer for Accurate (+ or - 1%) Measurement of Solar Irradiances Equal to 10,000 Solar Constants,' gives additional information on radiometer described elsewhere. Self-calibrating, water-cooled, thermopile radiometer measures irradiance produced in solar image formed by parabolic reflector or by multiple-mirror solar installation.

B84-10291
HEAT STORAGE AND TRANSPORT
P. A. BAHRAMI
Apr. 1985
NPO-15468 **Vol. 8, No. 4, P. 488**

System for storing large amounts of heat per unit volume comprises encapsulated sealed pellets of phase-change materials dispersed and suspended in inert fluid-transport medium.

B84-10292
SOLAR SHUTTER
R. R. HALE (CALTECH)
Apr. 1985
NPO-15428 **Vol. 8, No. 4, P. 489**

Solar receiver turned off by movable reflective shutter. When reflective surface interposed across optical axis, incoming solar heat reflected back to concentrator for rejection into space.

B84-10293
SOLAR-HEATED GASIFIER
S. A. QADER (CALTECH)
Apr. 1985
NPO-15071 **Vol. 8, No. 4, P. 488**

Catalytic coal and biomass gasifer system heated by solar energy. Sunlight from solar concentrator focused through quartz window onto ceramic-honeycomb absorber surface, which raises temperature of reactant steam, fluidizing gas, and reactor walls.

B84-10294
POINT-FOCUSING SOLAR-POWER DISTRIBUTED RECEIVERS
J. W. LUCAS (CALTECH)
Apr. 1985
NPO-15578 **Vol. 8, No. 4, P. 489**

Two-volume annual report describes development work

aimed at achieving large-scale production of modular, point-focusing distributed receivers (PFDR's) for solar-powered generation of electricity or thermal power for industrial use.

B84-10295
PURIFICATION OF SOLAR PONDS
S. CARPENTER
Apr. 1985
NPO-15397 **Vol. 8, No. 4, P. 489**
Flocculatory agents added to solar saltponds remove turbidity to increase solar-energy collection efficiency. Flocculating agent or bacteriocide used to remove microorganisms sprayed onto pond from airplane and allowed to settle to bottom of pond.

B84-10296
A CERAMIC HEAT EXCHANGER FOR SOLAR RECEIVERS
C. ROBERTSON JR. (General Electric Co.) and L. STACY (General Electric Co.)
Apr. 1985
NPO-15771 **Vol. 8, No. 4, P. 489**
Design intended for high-temperature service. Proposed ceramic-tube and header heat exchangers used for solar-concentrating collector operating in 25- to 150-KW power range at temperatures between 2,000 degrees and 3,000 degrees F (1,095 degrees and 1,650 degrees C).

B84-10297
CALIBRATING FOR IONOSPHERIC PHASE DELAYS
P. F. MACDORAN (CALTECH)
Apr. 1985
NPO-15430 **Vol. 8, No. 4, P. 489**
Technique determines ionospheric phase delay on real-time universally applicable basis in terms of electrons per meter squared by coherently modulating two L-band carrier frequencies received from two Global Positioning System satelites. Two pseudorandom number sequences cross-correlated to derive delay time.

B84-10298
GENERAL DESIGN CONSIDERATIONS FOR REMOTE SENSORS
F. C. BILLINGSLEY (CALTECH)
Apr. 1985
NPO-15930 **Vol. 8, No. 4, P. 490**
Report discusses design of orbiting remote sensors. Needs of users considered in light of satellite capabilities. Multiple-resolution sensor satisfies several disciplines otherwise competing for spatial and spectral resolution.

B84-10299
ELECTRON-ATTACHMENT PROFILES
A. CHUTJIAN and J. M. AJELLO
Apr. 1985
NPO-14865 **Vol. 8, No. 4, P. 490**
Report available that describes technique of photoelectron spectroscopy to measure shapes of threshold electron-attachment cross sections of various gases.

B84-10300
COMPOSITE SPECTROMETER PRISMS
J. B. BRECKINRIDGE (CALTECH), N. A. PAGE (CALTECH), and J. M. RODGERS (University of Arizona)
Apr. 1985
NPO-16060 **Vol. 8, No. 4, P. 490**
Efficient linear dispersive element for spectrometer instruments achieved using several different glasses in multiple-element prism. Good results obtained in both two-and three-element prisms using variety of different glass materials.

B84-10301
THERMAL COMPENSATOR FOR PARABOLOIDAL REFLECTOR
C. G. STANICH (Daedalus Enterprises, Inc.) and F. G. OSTERWISCH (Daedalus Enterprises, Inc.)
Apr. 1985
NPO-16145 **Vol. 8, No. 4, P. 490**
Mounting structure holds off-axis paraboloidal collimating mirror so that optical axis constantly focused and remains stationary with respect to fixed point over wide temperature range.

B84-10302
PARABOLOIDAL-DISH POWER MODULES
W. R. REVERE (CALTECH), J. M. BOWYER (CALTECH), T. FUJITA (CALTECH), and H. I. AWAYA (CALTECH)
Apr. 1985
NPO-16100 **Vol. 8, No. 4, P. 490**
Study determines configurational tradeoffs for particular paraboloidal-dish power system for isolated-load applications. Continuous level of power supplied with high reliability by using power system with modular paraboloidal-dish power units.

04 MATERIALS

B84-10074
UPGRADING METALLURGICAL-GRADE SILICON
L. M. WOERNER (J.C. Schumacher Co.) and E. B. MOORE (J.C. Schumacher Co.)
Jan. 1985
NPO-15076 **Vol. 8, No. 3, P. 353**
Closed-loop process produces semiconductor-grade silicon. Metallurgical-grade silicon converted to ultrapure silicon by reacting with hydrogen and silicon tetrahalide to form trihalosilane, purifying this intermediate and again decomposing to high purity silicon in third stage. Heterogeneously and homogeneously nucleated polycrystalline silicon used in semiconductor device applications and in silicon photovoltaic solar cell fabrication.

B84-10075
CONTAINERLESS MANUFACTURE OF GLASS OPTICAL FIBERS
R. J. NAUMANN and E. C. ETHRIDGE
Jan. 1985
MFS-25905 **Vol. 8, No. 3, P. 354**
Contamination and crystallization reduced in proposed process. Solid optical fiber drawn from an acoustically levitated lump of molten glass. New material added in solid form, melted and then moved into main body of molten glass. Single axis acoustic levitation furnances levitate glass melts at temperature up to about 700 degrees C. Processing in unit limited to low-melting temperature glasses.

B84-10076
EQUATION FOR ELECTROLYTE VISCOSITY
R. F. FEDORS (CALTECH)
Jan. 1985
NPO-15096 **Vol. 8, No. 3, P. 355**
Equation agrees with measurements over wide concentration range. Plot of calculated values from equation and measured values show close match except at extremely low concentrations of electrolyte. Other equations do not match data as well and limited to dilute solutions.

B84-10077
PRESSURE-LETDOWN PLATES FOR COAL GASIFIERS
E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15965 **Vol. 8, No. 3, P. 355**

Variation of pseudoporous plates used with coal gasifiers in pressure letdown stage of processing minimize clogging. Rotating plates containing variable gap annuli continually change flow path to enable erosionless reduction of gas pressure. Particles that otherwise clog porous plugs pass through gaps.

B84-10078
TESTING CERAMICS FOR DIESEL ENGINES
H. W. SCHNEIDER (CALTECH)
Jan. 1985
NPO-15824 **Vol. 8, No. 3, P. 356**
Adaptation of diesel engine allows prestressed ceramic materials evaluated under realistic pressure, temperature, and stress without introducing extraneous stress. Ceramic specimen part of prechamber of research engine. Specimen held in place by clamp, introduces required axial compressive stress. Specimen -- cylindrical shell -- surrounded by chamber vented or pressurized to introduce requisite radial stress in ceramic. Pressure chamber also serves as safety shield in case speimen disintegrates. Materials under consideration as cylinder liners for diesel engines.

B84-10079
PURE GLASSES FROM MULTICOMPONENT GELS
S. P. MUKHERJEE (Battelle Columbus Laboratories)
Jan. 1985
NPO-16160 **Vol. 8, No. 3, P. 357**
Report describes experiments with multicomponent gels for preparation of pure glass. Experiments aimed at developing zerogravitation process for fabrication of low-loss optical fibers.

B84-10080
VACUUM BAKING TO REMOVE VOLATILE MATERIALS
J. A. MUSCARI (Martin Marietta Corp.)
Jan. 1985
NPO-15648 **Vol. 8, No. 3, P. 357**
Outgassing reduced in some but not all nonmetallic materials. Eleven polymeric materials tested by determining outgassing species as temperature of conditioned and unconditioned materials raised to 300 degrees C. Conditioning process consisted of vacuum bake for 24 hours at 80 degrees C in addition to usual cure. Baking did not change residual gas percentage of water molecules.

B84-10081
SOLUTION POTENTIALS INDICATE ALUMINUM-ALLOY TEMPERS
M. D. DANFORD
Jan. 1985 See Also NASA TM-82459 (N82-22345)
MFS-25846 **Vol. 8, No. 3, P. 357**
Report discusses use of solution potential as measure of temper of aluminum alloys. Technique based on fact that different tempers or heat treatments exhibit different solution potentials as function of aging time.

B84-10082
PROPERTIES OF LOW-EXPANSION LAMINATES
M. KURAL (Lockheed Missiles & Space Company, Inc.)
Jan. 1985
MFS-25859 **Vol. 8, No. 3, P. 358**
Laminate elastic constants and coefficients of thermal expansion calculated for near-zero-expansion graphite/ aluminum and graphite/ magnesium composites. Report presents results in graphic form for these properties as function of laminate angle and fiber volume fraction for four high-modulus continuous-pitch fiber.

B84-10083
ELASTOMER ENCAPSULANT FOR SOLAR-CELL ARRAYS
B. BAUM (Springborn Laboratories, Inc.) and P. B. WILLIS (Springborn Laboratories, Inc.)
Jan. 1985
NPO-15663 **Vol. 8, No. 3, P. 358**
Butyl acrylate syrups useful potting compounds for encapsulating photovoltaic cells in modular arrays. Material pourable liquid pumped into module, then cured to rubbery consistency. Cured material is thermoset elastomer highly transparent, low cost, flexible and with good low-temperature properties.

B84-10084
EUTECTIC-ALLOY MORPHOLOGY
R. G. PIRICH (Grumman Aerospace Corp.) and W. J. POIT (Grumman Aerospace Corp.)
Jan. 1985
MFS-25937 **Vol. 8, No. 3, P. 358**
Deviation in controlled-rod eutectic morphology anticipated for diffusion only crystal growth characterized at low solidification velocities. Naturally induced, gravity-related convective instabilities result in nonalined irregularly dispersed fibers or platelets. Lower solidification limit for controlled growth Bi/Mn alloys is 1 centimeter/ hour.

B84-10085
RELIABILITY STUDIES FOR FATIGUE-CRACK DETECTION
B. K. CHRISTNER (Martin Marietta Corp.), W. D. RUMMEL (Martin Marietta Corp.), and J. KNADLER (Martin Marietta Corp.)
Jan. 1985
MFS-27031 **Vol. 8, No. 3, P. 358**
Reusable test panels available to assess reliability of techniques that use fluorescent penetrant to detect fatigue cracks. Ultrasonic cleaning method developed for removing penetrant from panels prior to reuse.

B84-10086
MAKING PURE FINE-GRAINED INORGANIC POWDER
C. WOOD (CALTECH)
Jan. 1985
NPO-16398 **Vol. 8, No. 3, P. 358**
Sustained arc plasma chemical reactor fabricates very-fine-grained inorganic solids having low thermal conductivity. Powder fabrication method, based on plasma tube technique produces pure solids without contamination commonly produced by grinding.

B84-10087
FLUIDIZED-BED REACTOR SYSTEM
A. D. MORRISON (CALTECH)
Jan. 1985
NPO-15975 **Vol. 8, No. 3, P. 359**
Gas pyrolysis in hot fluidized beds minimized by use of selectively filtered radiation and parabolic cavity. Reactor is parabolic cavity of two or more axes in which light emanating from one axis bounces off walls of cavity and passes through object axis to heat sample.

B84-10088
SAMARIUM/COBALT MAGNETS
D. DAS (Charles Stark Draper Laboratories, Inc.), K. KUMAR (Charles Stark Draper Laboratories, Inc.), R. FROST (Charles Stark Draper Laboratories, Inc.), and C. CHANG (Charles Stark Draper Laboratories, Inc.)
Jan. 1985
MFS-27006 **Vol. 8, No. 3, P. 359**
Intrinsic magnetic coercivities of samarium cobalt magnets made to approach theoretical limit of 350 kA/m by carefully eliminating oxygen from finished magnet by hot isostatic pressing (HIP). HIP process viable alternative to currently used sintering process.

B84-10089
REDUCING LIQUID PERMEATION THROUGH POLYMER SHEETS
R. F. FEDORS (CALTECH)
Jan. 1985
NPO-15802 **Vol. 8, No. 3, P. 359**

Permeation of liquid through polymer sheets retarded by including in polymer solute for excluded liquid. Long-term or steady state permeability not reduced by solute inclusions.

B84-10090
COAL-FACE FRACTURE WITH A TWO-PHASE LIQUID
E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15849 **Vol. 8, No. 3, P. 359**

In new method for mining coal without explosive, two-phase liquid such as CO2 and water, injected at high pressure into deeper ends of holes drilled in coal face. Liquid permeates coal seam through existing microfractures; as liquid seeps back toward face, pressure eventually drops below critical value at which dissolved gas flashvaporizes, breaking up coal.

B84-10091
POLYURETHANE-FOAM MASKANT
R. BODEMEIJER (Rockwell International Corp.)
Jan. 1985
MFS-19786 **Vol. 8, No. 3, P. 359**

Brown wax previously used to mask hardware replaced with polyurethane foam in electroplating and electroforming operations. Foam easier to apply and remove than wax and does not contaminate electrolytes.

B84-10092
STREAMING-POTENTIAL STUDIES
D. GREGONIS (University of Utah), R. VAN WAGENEN (University of Utah), S. MA (University of Utah), and J. ANDRADE (University of Utah)
Jan. 1985
MFS-25657 **Vol. 8, No. 3, P. 359**

Apparatus and experimental technique based on measurements of streaming potentials evaluates effects of surface coatings for reducing or eliminating electro-osmotic flow.

B84-10093
MATHEMATICAL MODEL FOR GAS DISSOLUTION IN GLASS
M. C. WEINBERG (GTE), P. I. ORONATO (GTE), and D. R. UHLMANN (MIT)
Jan. 1985
NPO-15104 **Vol. 8, No. 3, P. 360**

Mathematical model calculates rate of small oxygen-bubble contraction in soda/lime/silicate melts in presence of foreign nondiffusing gas. Process of interest in optical glass fabrication.

B84-10303
DESULFURIZATION OF COAL IN FLUIDIZED BEDS
R. MADDURY (CALTECH) and J. KALVINSKAS (CALTECH)
Apr. 1985
NPO-15924 **Vol. 8, No. 4, P. 493**

Experimental dry chemical process for removing sulfur from coal-and thereby reducing harmful sulfur emissions from coal-fired electric powerplants-promises more economical and effective than older wet chemical processes. New process faster, requires smaller amounts of chemical reagents, and produces no liquid effluents, which poses disposal problem.

B84-10304
INCREASING THE DUCTILITY OF ELECTROPLATED METALS
N. PATON (Rockwell International Corp.) and C. RHODES (Rockwell International Corp.)
Apr. 1985
MFS-19873 **Vol. 8, No. 4, P. 494**

Hot isostatic pressing effective in improving ductility of metal plating. Previously hot isostatic pressing used on powder-metallurgy parts and castings but not on electroplated parts. To test idea, copperplated heated to 800 degrees C at pressure of 23,000 psi (160 MN/m2) for 4 hours. When part examined metallographically, completely free from porosity.

B84-10305
EUTECTIC CONTACT INKS FOR SOLAR CELLS
B. ROSS (Bernd Ross Associates)
Apr. 1985
NPO-15171 **Vol. 8, No. 4, P. 494**

Low-resistance electrical contacts formed on solar cells by melting powders of eutectic composition of semiconductor and dopant. Process improves cell performance without subjecting cell to processing temperatures high enough to degrade other characteristics.

B84-10306
LIGHTWEIGHT HIGH-TEMPERATURE THERMAL INSULATION
W. R. WAGNER (Rockwell International Corp.) and J. I. FASHEH (Rockwell International Corp.)
Apr. 1985
MFS-19754 **Vol. 8, No. 4, P. 495**

Fine Ni/Cr fibers sintered into corrosion-resistant, fireproof batt. Possible applications include stoves, furnaces, safes, fire clothing, draperies in public buildings, wall firebreaks, airplane walls, and jet engine components. New insulation takes advantage of some of same properties of nickel/chromium alloy useful in heating elements in toasters, namely, corrosion and oxidation resistance even at high temperatures.

B84-10307
INHIBITING WET OXIDATION OF AMMONIA
D. B. L. ONISKO (National Research Council)
Apr. 1985
ARC-11407 **Vol. 8, No. 4, P. 496**

Simple modification of wet-oxidation process for treating organic waste reduces loss of fixed nitrogen, potentially valuable byproduct of process. Addition of sufficient sulfuric acid to maintain reaction pH below 3 greatly reduces oxidation of ammonia to free nitrogen. No equipment modification required.

B84-10308
APPLYING UNIFORM POLYMER COATINGS TO MICROSPHERES
M. C. LEE (CALTECH)
Apr. 1985
NPO-16075 **Vol. 8, No. 4, P. 496**

Acoustic levitation yields even coating on glass microspheres. Automatic Coating Apparatus injects polymer into acoustic levitator, moves glass sphere into polymer, dries polymer, and removes coated sphere. Apparatus injects more polymer for coating another sphere, and cycle repeats.

B84-10309
DEFECT CHEMISTRY OF HG1-XCDXTE
H. VYDYANATH (Honeywell, Inc.), D. NELSON (Honeywell, Inc.), J. DONOVAN (Honeywell, Inc.), P. CRICKARD (Honeywell, Inc.), A. BARNES (Honeywell, Inc.), R. ABBOTT (Honeywell, Inc.), and R. LANCASTER (Honeywell, Inc.)
Apr. 1985
MFS-25851 **Vol. 8, No. 4, P. 497**

Intermediate goal of this investigation to correlate nature and concentration of lattice defects with physicochemical conditions of preparation; namely, temperature, partial pressures of constituent elements and/or dopant concentration. Result of this investigation: possible to predict and control nature and concentration of defects as function of preparation conditions.

B84-10310
LOW-TEMPERATURE EXTRACTION OF OIL FROM SHALE
L. E. COMPTON (CALTECH)
Apr. 1985
NPO-15656 **Vol. 8, No. 4, P. 498**

Technique increases recovery and energy efficiency. Advantages of method greater product yield and, because of the relatively low temperatures, minimal gas formation, smaller amounts of char byproduct, and less carbonate-rock decomposition. Up to 94 percent by weight of organic material in shale extracted.

B84-10311
HIGH-TEMPERATURE COATING FOR TITANIUM
R. J. MELL (IIT Research Institute) and Y. HARADA (IIT Research Institute)
Apr. 1985
NPO-16222 **Vol. 8, No. 4, P. 498**
Wet coating mixture composed of graphite pigment potassium silicate binder solution and distilled water. Resulting coating has electrical resistivity of less than 10 to the 6th power ohm-cm.

B84-10312
PREDICTING POLYMER/LIQUIDE INTERACTIONS
R. F. FEDORS (CALTECH)
Apr. 1985
NPO-14874 **Vol. 8, No. 4, P. 498**
Calculations of liquid absorption by rubber vulcanizates agree with experimental results. Equation allows calculation of swelling of rubber vulcanizates by liquids, based on knowledge of chemical structure of polymer and solvent. Calculated values agree favorably with experimental data.

B84-10313
SILICON FORMATION FOR SOLAR CELLS
K. SANCIER (SRI International)
Apr. 1985
NPO-14973 **Vol. 8, No. 4, P. 498**
Highly pure silicon obtained for solar cells by proposed technique that sprays liquid-sodium droplets into SiF4 gas. Resulting freely flowing powder of silicon and sodium fluoride will not adhere to reactor walls and easily transferred to melt separator to recover silicon.

B84-10314
INTEGRATED FUEL CELL/COAL GASIFIER
J. F. FERRALL (CALTECH)
Apr. 1985
NPO-16062 **Vol. 8, No. 4, P. 498**
Powerplant design with low-temperature coal gasifier coupled to highly-exothermic fuel cell for efficient production of dc power eliminates need for oxygen in gasifier and achieves high fuel efficiency with recycling of waste heat from fuel cell.

B84-10315
ELASTOMERIC CATHODE BINDER
S. P. S. YEN (CALTECH), D. S. SHEN (CALTECH), and R. B. SOMOANO (CALTECH)
Apr. 1985
NPO-15424 **Vol. 8, No. 4, P. 499**
Soluble copolymer binder mixed with cathode material and solvent forms flexible porous cathode used in lithium and Ni/Cd batteries. Cathodes prepared by this process have lower density due to expanding rubbery binder and greater flexibility than conventional cathodes. Fabrication procedure readily adaptable to scaled-up processes.

B84-10316
ACTIVATED INTERNAL GETTERING
J. K. LIU (CALTECH), G. H. SCHWUTTKE, and K. M. KOLIWAD
Apr. 1985
NPO-15530 **Vol. 8, No. 4, P. 499**
Lifetimes of minority carriers in silicon webs improved by annealing. Heat treatment of silicon web ribbons considerably improves efficiency of solar cells.

B84-10317
PREPARING INSB SUBSTRATES
R. P. VASQUEZ (CALTECH), B. F. LEWIS (CALTECH), and F. J. GRUNTHANER (CALTECH)
Apr. 1985
NPO-16127 **Vol. 8, No. 4, P. 499**
Molecular-beam epitaxial substrates passivated by chloride film growth. Chloride layer produced by direct chlorination, by chloride radicals in solutions, or by formation of preliminary oxide layer followed by chloride substitution.

B84-10318
CLEANING THE WALLS OF A SILANE REACTOR
K. A. YAMAKAWA (CALTECH)
Apr. 1985
NPO-15851 **Vol. 8, No. 4, P. 499**
Scraper removes silicon deposits from inner walls of reactor vessel. Scraper supported by gas bearing. Scraper made of non-contaminating material such as quartz or silicon.

B84-10319
STABILIZED ALUMINUM TITANATE
J. E. SCHROEDER (CALTECH)
Apr. 1985
NPO-16227 **Vol. 8, No. 4, P. 499**
Stable, potentially-inexpensive, cubic crystalline alpha aluminum titanate that shows no phase change to 1,700 K used in heat exchangers. Particular stabilizing species must be selected with careful attention to crystal dimensions and bond angles of alpha and beta phases of aluminum titanate.

B84-10320
MOLTEN-SALT ELECTROLYSIS
D. CUBICCIOTTI (SRI International)
Apr. 1985
NPO-15535 **Vol. 8, No. 4, P. 499**
Concept of electrolytic decomposition of gaseous hydrogen sulfide to yield gaseous sulfur at anode and hydrogen gas at cathode considered.

05 LIFE SCIENCES

B84-10094
TRANSDUCERS FOR HEAT RESEARCH
C. FELDSTEIN (CALTECH), S. MEERBAUM (CALTECH), G. W. LEWIS (CALTECH), and V. H. CULLER (CALTECH)
Jan. 1985
NPO-15095 **Vol. 8, No. 3, P. 363**
Series of transducers with seven different configurations enable measurement of forces and displacements in heart wall. New transducers small, cause minimal perturbation of heart function and attached and detached without causing excessive tissue damage. All units implanted or removed during single heartbeat, permitting rapid relocation for detail mapping.

B84-10095
AQUATIC PLANTS AID SEWAGE FILTER
B. C. WOLVERTON
Jan. 1985
MFS-25808 **Vol. 8, No. 3, P. 364**
Method of wastewater treatment combines micro-organisms and aquatic plant roots in filter bed. Treatment occurs as liquid flows up through system. Micro-organisms, attached themselves to rocky base material of filter, act in several steps to decompose organic matter in wastewater. Vascular aquatic plants (typically, reeds, rushes, cattails, or water hyacinths) absorb nitrogen, phosphorus, other nu-

trients, and heavy metals from water through finely divided roots

B84-10096
MONITORING MARINE MICROBIAL FOULING
R. COLWELL (University of Maryland)
Jan. 1985
MFS-25928 **Vol. 8, No. 3, P. 364**
Two techniques developed for studying marine fouling. Methods originally developed to study fouling of materials used in Space Shuttle solid fuel booster rockets. Methods used to determine both relative fouling rates and efficacy of cleaning methods to remove fouling on various surfaces including paints, metals, and sealants intended for marine use.

B84-10097
EXPERIMENTAL ECOSYSTEMS SEALED IN GLASS
J. A. HANSON (CALTECH)
Jan. 1985
NPO-15712 **Vol. 8, No. 3, P. 365**
Report describes investigation of dynamics of microbial ecosystems sealed in 1-liter flasks and exposed to Sunlight or artifical light for extended periods. Many organisms survived more than 15 years. Such svstems have primary productivity and quantum efficiencies comparable to estimates for Earth's ecosystems.

B84-10098
ESTIMATING HEALTH SERVICES REQUIREMENTS
H. M. ALEXANDER (CALTECH)
Jan. 1985
NPO-14151 **Vol. 8, No. 3, P. 366**
In computer program NOROCA populations statistics from National Center for Health Statistics used with computational procedure to estimate health service utilization rates, physician demands (by specialty) and hospital bed demands (by type of service). Computational procedure applicable to health service area of any size and even used to estimate statewide demands for health services.

B84-10099
PARAMETERS AFFECTING ELECTROPHORESIS
J. VANDERHOFF (Lehigh University) and F. MICALE (Lehigh University)
Jan. 1985
MFS-25593 **Vol. 8, No. 3, P. 366**
Experimental approaches and problems facing successful continuous particle separation by electrophoresis outlined in short report. Influence of particle size, concentration, and charge discussed.

B84-10100
DIALYSIS EXTRACTION FOR CHROMATOGRAPHY
V. J. JAHNSEN (CALTECH)
Jan. 1985
NPO-15691 **Vol. 8, No. 3, P. 366**
Chromatographic-sample pretreatment by dialysis detects traces of organic contaminants in water samples analyzed in field with minimal analysis equipment and minimal quantities of solvent. Technique also of value wherever aqueous sample and solvent must not make direct contact.

B84-10321
PROBE FOLLOWER FOR MOVING BLOOD VESSELS
R. E. FRAZER (CALTECH) and T. W. ANDREWS (CALTECH)
Apr. 1985
NPO-15898 **Vol. 8, No. 4, P. 503**
Probes track vessel expansion and contraction with minimal perturbation. Nozzle back-pressure changes at cuff on blood vessel basis for monitoring position of probe in blood vessel. Fluidic amplifiers use signals to control three-axis servo that centers measuring probe between sensing-nozzle pairs at cuff.

B84-10322
PHOTOGRAPHIC SCREENING FOR EYE DEFECTS
J. RICHARDSON
Apr. 1985 See Also NASA TM-82359 (N83-34565/NSP)
MFS-27045 **Vol. 8, No. 4, P. 504**
Images of retinas examined for characteristic patterns. Color photographs of retinas taken. Proper alinement of eye obtained by asking subject to gaze at light-emitting diode. 'Red-eye' patterns in resulting color photographs examined by trained observers for signs of ocular defects. System used to check power of contact lenses and eyeglasses by taking photographs with these items in place.

06 MECHANICS

B84-10101
TEMPERATURE-GRADIENT FURNACE FOR SOLIDIFICATION EXPERIMENTS
B. R. ALDRICH and W. D. WHITT
Jan. 1985
MFS-25963 **Vol. 8, No. 3, P. 369**
Gradients are controllable from zero to 500 degrees C/cm. Typical temperature profile superimposed on partial cross section of furnace. Steepness of gradient varied by adjusting flow of energy to and from different zones of furnace. Specimen placed in ampoule moved inside ceramic tube according to needs of experiment. Furnace provides axial temperature profiles for material processing experiments.

B84-10102
IMPROVED ELLIPSOIDAL RADIATION FURNACE
E. C. ETHRIDGE
Jan. 1985
MFS-25933 **Vol. 8, No. 3, P. 370**
Spherical reflector around heat source increases efficiency and minimizes power requirements. Furnace consists of ellipsoid with point heat source, at one focus and sample heated at other focus. Spherical reflector with circular slit surrounds heat source. All radiation not passing through circular slit in spherical reflector reflected back to lamp. Radiation passing through spherical slit focused by ellipsoid surface onto sample. Arrangement uses heat efficiently, reduces waste heat generation and permits full view of specimen.

B84-10103
DOUBLE LINEAR DAMAGE RULE FOR FATIGUE ANALYSIS
G. HALFORD and S. MANSON (Case Western Reserve University)
Feb. 1985 See Also NASA TM-81517 (N80-23684/NSP)
LEW-14058 **Vol. 8, No. 3, P. 371**
Double Linear Damage Rule (DLDR) method for use by structural designers to determine fatigue-crack-initiation life when structure subjected to unsteady, variable-amplitude cyclic loadings. Method calculates in advance of service how many loading cycles imposed on structural component before macroscopic crack initiates. Approach eventually used in design of high performance systems and incorporated into design handbooks and codes.

B84-10104
EDDY-CURRENT INSPECTION OF BALL BEARINGS
B. BANKSTON
Jan. 1985
MFS-25833 **Vol. 8, No. 3, P. 371**
Custom eddy-current probe locates surface anomalies.

Low friction air cushion within cone allows ball to roll easily. Eddy current probe reliably detects surface and near-surface cracks, voids, and material anomalies in bearing balls or other spherical objects. Defects in ball surface detected by probe displayed on CRT and recorded on strip-chart recorder.

B84-10105
SURFACE-STREAMLINE FLOW VISUALIZATION
L. LANGSTON (University of Connecticut) and M. BOYLE (University of Connecticut)
Jan. 1985
LEW-13875 **Vol. 8, No. 3, P. 372**

Matrix of ink dots covers matte surface of polyester drafting film. Film placed against wind-tunnel wall. Layer of methyl salicylate (oil of wintergreen) sprayed over dotted area. Ink dot streaklines show several characteristics of flow, including primary saddle point of separations, primary horseshoe vortex and smaller vortex at cylinder/ endwall junction. Surface streamline flow visualization technique suitable for use in low-speed windtunnels or other low-speed gas flows.

B84-10106
STRUCTURAL TURNBUCKLE BEARS COMPRESSIVE OR TENSILE LOADS
W. A. BATEMAN (Rockwell International Corp.) and C. H. LANG (Rockwell International Corp.)
Jan. 1985
MFS-25939 **Vol. 8, No. 3, P. 373**

Column length adjuster based on turnbuckle principle. Device consists of internally and externally threaded bushing, threaded housing and threaded rod. Housing attached to one part and threaded rod attached to other part of structure. Turning double threaded bushing contracts or extends rod in relation to housing. Once adjusted, bushing secured with jamnuts. Device used for axially loaded members requiring length adjustment during installation.

B84-10107
BEAM WINDOW FOR PRESSURE CHAMBERS
J. W. BRANSFORD (National Bureau of Standards) and J. G. AUSTIN JR. (National Bureau of Standards)
Jan. 1985
MFS-25961 **Vol. 8, No. 3, P. 374**

Window resists products of combustion experiments. Sodium chloride window seals over chamber pressures from 0.1 to 13.8 MPa while absorbing minimal energy from CO2 laser beam that passes through it into chamber. Window inexpensive and easily replacable.

B84-10108
FABRICATING THIN-SHELL HEAT-TRANSFER MODELS
D. E. AVERY, G. K. BALLARD, M. L. WILSON, and J. H. ALLEN SR. (Johnson Space Center)
Jan. 1985
LAR-13087 **Vol. 8, No. 3, P. 375**

Freestanding shells produced for experimental aerodynamic-heating tests. Heat transfer shells require several steps and several precise molds. First, interlocking aluminum male and female molds fabricated. Holes for thermocouples drilled through male mold at desired locations. Wires having same diameter as thermocouple wire placed through holes in male mold flush to female mold. Epoxy exposed to vacuum to remove air bubbles poured between male and female molds to form thin female mold. Once mold cured, wires removed and aluminum molds separated.

B84-10109
FLEXIBLE HEAT PIPE
W. B. BIENERT (Dynatherm Corp.) and D. A. WOLF (Dynatherm Corp.)
Jan. 1985
GSC-12864 **Vol. 8, No. 3, P. 376**

Narrow Tube carries 10 watts or more to moving parts. Heat pipe 12 inches long and diameter of 0.312 inch (7.92mm). Bent to minimum radius of 2.5 blocks. Flexible section made of 321 stainless steel tubing (Cajon Flexible Tubing or equivalent). Evaporator and condenser made of oxygen free copper. Working fluid methanol.

B84-10110
UNIFORM-TEMPERATURE WALLS FOR CLOUD CHAMBERS
G. FLEISCHMAN (Hughes Aircraft Co.)
Jan. 1985
MFS-25931 **Vol. 8, No. 3, P. 376**

Flat heat pipes rapidly transfer heat to and from experimental volumes. Heat pipe vapor chamber carries heat to and from thermo electric modules. Critical surface acts as evaporator or condenser in cloud physics experiments. Used as walls of spaceborne atmospheric cloud chambers. On Earth, used as isothermal floors for environmental test chambers.

B84-10111
ENERGY-ABSORBING AIRFRAMES FOR GENERAL AVIATION
H. D. CARDEN, R. J. HAYDUK, J. CRONKHITE (Helicopter Textron, Inc.), and V. BERRY (Helicopter Textron, Inc.)
Jan. 1985 See Also NASA CR-3603 (N82-33735/NSP)
LAR-12808 **Vol. 8, No. 3, P. 377**

Concept for protecting people in lightweight airplane crashes involves redesigning area between interior floor and outer skin of airplane belly to create subfloor strong enough to bear stresses of flight but crush under force of impact. Several concepts evaluated and five selected and designed as lower fuselage sections tested in NASA's crash-testing program. Notched corner concept, Corrugated Beam concept, Foam-Filled Cylinder concept, Corrugated Half Shell concept, and Canted Bulkhead concept. Experimental and analytical results indicate all five concepts perform well; upper floor remains structurally intact whereas crush zone collapses under essentially constant load.

B84-10112
INTERFEROMETER DETECTS ACOUSTIC EMISSIONS IN COMPOSITES
J. H. CANTRELL JR., R. O. CLAUSE (Virginia Polytechnic Institute and State University), J. C. WADE (Virginia Polytechnic Institute and State University), and P. S. ZERWEKH (Virginia Polytechnic Institute and State University)
Jan. 1985
LAR-12965 **Vol. 8, No. 3, P. 378**

Embedded single-mode optical fibers sample internal-stress fields directly. Statically loaded composite matrix emits pulsed ultrasonic waves which mechanically modulate embedded fiber and phase-modulate transmitted optical field. Modulation detected by optical interferometry and Fourier optical processing converted to electronic signal proportional to acoustic field amplitude integated along length of fiber embedded in specimen. Technique used for measurements of both high- and low-frequency CW acoustic fields as well as high-frequency transients.

B84-10113
MEASURING ABSOLUTE OXYGEN PRESSURE
R. RICHTER (CALTECH)
Jan. 1985
NPO-16131 **Vol. 8, No. 3, P. 379**

Sensor determines absolute pressure of oxygen without reference pressure source. Absolute oxygen pressure transducer with control circuit enables measurement without reference pressure. Transducer, two part device, combines solid electrolyte membranes sensor with diffusional orifice. Device adapted for direct control of oxygen pressure in combustion mixtures.

B84-10114
LOW-STRESS SEALING OF PRESSURE TRANSDUCERS
R. E. KROY (Rockwell International Corp.)
Jan. 1985

MFS-19877 **Vol. 8, No. 3, P. 380**

Compliant washer seals high pressures without excessive compressive stress on transducer. Conformal washer serves as effective seal for transducer passing through walls of pressure vessel. Washer makes it unnecessary to tighten mounting nut to high torque, which could damage transducer or adversely affect accuracy. Washer also used to seal mountings for temperature sensors and other devices.

B84-10115
PREVENTING FIRES IN CRYOGENIC OXIDIZER LINES
W. R. WAGNER (Rockwell International Corp.)
Jan. 1985
MFS-19830 **Vol. 8, No. 3, P. 380**

Friction and compression induced ignition prevented by heat-dissipation layer. Thin layer of copper placed inside surfaces of pipes and other parts in contact with flowing liquid oxygen, fluorine, or other oxidizers. Copper layer of only 0.001 to 0.005 inch (0.0254 to 0.127 mm) ensures heat away from hotspots thereby discouraging ignition. Copper layer increases oxygen ignition threshold of pipe by 5 to 20 times.

B84-10116
MEASURING RIND THICKNESS ON POLYURETHANE FOAM
C. JOHNSON (Martin Marietta Corp.), J. MILLER (Martin Marietta Corp.), and H. BROWN (Martin Marietta Corp.)
Jan. 1985
MFS-25941 **Vol. 8, No. 3, P. 381**

Nondestructive test determines rind thickness of polyurethane foam. Surface harness of foam measured by Shore durometer method: hardness on Shore D scale correlates well with rind thickness. Shore D hardness of 20, for example, indicates rind thickness of 0.04 inch (1 millimeter). New hardness test makes it easy to determine rind thickness of sample nondestructively and to adjust fabrication variables accordingly.

B84-10117
REDUCING THERMAL EXPANSIVITY OF COMPOSITE PANELS
D. D. SMITH (Boeing Aerospace Co.)
Jan. 1985
MFS-25793 **Vol. 8, No. 3, P. 382**

Coefficient of thermal expansion of laminated graphite/epoxy composite panels altered after panels cured by postcuring heat treatment. Postcure decreases coefficient of thermal expansion by increasing crosslinking between molecules. Treatment makes it possible to reprocess costly panels for requisite thermal expansivity instead of discarding them.

B84-10118
SINTERED LINING FOR HEAT-PIPE EVAPORATOR
D. M. ERNST (Thermacore, Inc.) and G. Y. EASTMAN (Thermacore, Inc.)
Jan. 1985
NPO-16172 **Vol. 8, No. 3, P. 382**

Hotspots eliminated by lining inner wall. Distribution of heat transfer liquid in heat-pipe evaporator improved by lining inner wall with layer of sintered metal. Sintered layer takes place of layer of screen wick formerly sintered or bonded to wall. Since sintered layer always full of liquid, no hotspot of type that previously arose where former screen wick did not fit properly against wall.

B84-10119
JOINT FOR ERECTABLE AND COLLAPSIBLE FRAMES
T. E. PELISCHEK
Jan. 1985
MSC-20635 **Vol. 8, No. 3, P. 383**

Joint mechanism allows truss structure to be folded and stowed in small space. Mechanism includes hinge attached to two truss elements connected by two links, tension bar, and compression bar. When folded elements are released, springs in joint mechanism rotate truss elements about hinge and lock mechanism to form single member. Developed for structures erected in space (antennas, solar panels, solar sails, and masts), joint mechanism adaptable to window-opening struts, folding furniture and television antennas.

B84-10120
LIGHTNING PROTECTION FOR COMPOSITE AIRCRAFT STRUCTURES
G. O. OLSON (The Boeing Co.)
Jan. 1985
LAR-12879 **Vol. 8, No. 3, P. 384**

Lightning protection system consisting of two layers of aluminum foil separated by layer of dielectric material protects graphite/epoxy composite structures on aircraft. Protective layer is secondarily applied lightning protection system, prime advantage of which is nullification of thermal and right angle effect of lightning arc attachment to graphite/epoxy laminate.

B84-10121
EFFICIENT JOINTS FOR GRAPHITE/EPOXY STRUCTURES
D. E. SKOUMAL (Boeing Aerospace Co.) and J. B. CUSHMAN (Boeing Aerospace Co.)
Jan. 1985 See Also NASA CR-3602 (N83-16787 NSP)
LAR-13091 **Vol. 8, No. 3, P. 385**

Bonded joints perform well through wide temperature range. Tests indicate significant improvement in joint efficients available through geometric modifications and hybrid material additions at adherent interfaces. Material modifications consisted of placing S-glass polyimide fabric in joint between adherents. Most fabric interface specimens delaminated between two fabric plies as opposed to failing in base adherents.

B84-10122
ACQUISITION OF DYNAMIC STRESS/STRAIN DATA
R. G. MINES (Rockwell International Corp.) and R. J. DEMONET (Rockwell International Corp.)
Jan. 1985
MSC-20589 **Vol. 8, No. 3, P. 385**

Computer program enables real-time data acquisition and plotting of stress strain by small, desk top computer. Program monitors load cell and multiple-strain gages during tension or compression loading. Scan routine triggered by specified change of applied load or longitudinal strain.

B84-10123
DYNAMIC SIMULATION AND STABILITY ANALYSIS
H. P. FRISCH and J. A. SANBORN
Jan. 1985
GSC-12810 **Vol. 8, No. 3, P. 385**

Dynamic Interaction Simulation of Controls and Structure (DISCOS) program developed for dynamic simulation and stability analysis of passive and actively controlled spacecraft. In use of DISCOS, physical system undergoing analysis generally described as cluster of contiguous flexible structures (bodies) that comprise mechanical system, such as spacecraft.

B84-10124
AERODYNAMIC ANALYSIS OF LOW-SPEED WING-FLAP SYSTEMS
H. W. CARLSON (Kentron International, Inc.) and K. B. WALKLEY (Kentron International, Inc.)
Jan. 1985
LAR-13116 **Vol. 8, No. 3, P. 386**

SUBAERF program developed for aerodynamic analysis and design of lowspeed wing-flap systems. SUBAERF based on linearized theory lifting-surface solution. Low speed aerodynamic analysis method used in SUBAERF provides estimates of wing performance which include effects of attainable leading edge thrust and vortex lift.

B84-10125
TURBINE-ENGINE TRANSIENT-ROTOR ANALYSIS
V. GALLARDO JR. (General Electric Co.), M. STALLONE (General Electric Co.), A. STORACE (General Electric Co.), and G. BLACK (General Electric Co.)
Jan. 1985
LEW-13726 **Vol. 8, No. 3, P. 386**
Computer program developed to predict structural dynamics of rotor system in gas turbine engines subjected to sudden unbalance. TETRA computer code calculates transient structural response of turbine engines due to blade loss or other time-dependent events. Used on structures other than turbine engines with little or no modification.

B84-10126
HEAT-EXCHANGER COMPUTATIONAL PROCEDURE FOR TEMPERATURE-DEPENDENT FOULING
L. CHIAPPETTA (United Technologies Corp.) and E. SZETELA (United Technologies Corp.)
Jan. 1985
LEW-13874 **Vol. 8, No. 3, P. 387**
Computer program predicts heat-exchanger performance under variety of conditions. Program provides rapid means of calculating distribution of fluid and wall temperatures, fuel deposit formation, and pressure losses at various locations in heat exchanger. Developed for use with heat exchanger that vaporizes fuel prior to fuel ignition; other applications possible.

B84-10127
STRUCTURAL ANALYSIS OF CYLINDRICAL THRUST CHAMBERS
W. ARMSTRONG (Lockheed Missiles & Space Co., Inc.) and M. PEARSON (Lockheed Missiles & Space Co., Inc.)
Jan. 1985
LEW-13655 **Vol. 8, No. 3, P. 387**
System of three computer programs developed for use with BOPACE finite-element program for analyzing cumulative plastic deformation of structures subject to high thermomechanical load cycles.

B84-10128
TURBULENT RECIRCULATING FLOWS IN ISOTHERMAL COMBUSTOR GEOMETRIES
D. LILLEY (Oklahoma State University) and D. RHODE (Oklahoma State University)
Jan. 1985
LEW-13894 **Vol. 8, No. 3, P. 387**
Computer program developed that provides mathematical solution to design and construction of combustion chambers for jet engines. Improved results in areas of combustor flow fields accomplished by this computerprogram solution, cheaper and quicker than experiments involving real systems for models.

B84-10129
COMPUTATION OF THREE-DIMENSIONAL COMBUSTOR PERFORMANCE
S. SRIVATSA (Garrett Turbine Engine Co.)
Jan. 1985
LEW-13930 **Vol. 8, No. 3, P. 388**
Existing steady-state 3-D computer program for calculating gasturbine flow fields modified to include computation of soot and nitrogen oxide emission. In addition, radiation calculation corrected for soot particles. These advanced tools offer potential of reducing design and development time required for gas-turbine combustors.

B84-10130
GENERATING TABLES OF THERMODYNAMIC PROPERTIES
S. N. NGUYEN (Rockwell International Corp.)
Jan. 1985
MSC-20701 **Vol. 8, No. 3, P. 388**
Thermodynamic Property Generation program produces tables for any fluid for which state equation, vapor pressure equation, specific heat equation, and critical constants are known. Program calculates thermodynamic properties at any state providing way of obtaining properties at extreme environmental conditions.

B84-10131
TRAJECTORY ANALYSIS AND THE ORBIT DETERMINATION
D. J. ALDERSON (CALTECH), F. H. BRADY (CALTECH), P. J. BRECKHELMER (CALTECH), J. B. COLLIER (CALTECH), J. E. EKELUND (CALTECH), J. ELLIS (CALTECH), D. E. HILT (CALTECH), A. R. KHATIB (CALTECH), V. N. LEGERTON (CALTECH), S. K. MCMAHON (CALTECH) et al
Jan. 1985
NPO-15586 **Vol. 8, No. 3, P. 388**
Two programs aid in trajectory analysis. DPTRAJ, ODP and their supporting utility programs capable of handling massive amounts of data and performing numerical calculations required for solving navigation problems associated with planetary fly-by and lander missions. Used extensively in support of Voyager.

B84-10132
ORBITAL MECHANICS ANALYSIS PROGRAM
W. C. SIMON (Rockwell International Corp.), S. C. JANKOWSKI (Rockwell International Corp.), and T. B. HUGHES (Rockwell International Corp.)
Jan. 1985
MSC-20700 **Vol. 8, No. 3, P. 389**
Orbital Mechanics Analysis Program provides engineers with simple tool for analysis or synthesis of any orbital maneuvering function involving vehicle and target. Program useful in such applications as proximity operations and rendezvous maneuvers.

B84-10133
THERMAL RADIATION ANALYZER
R. A. VOGT, C. L. JENSEN (Martin Marietta Corp.), R. G. GOBLE (Martin Marietta Corp.), and R. J. CONNER (Martin Marietta Corp.)
Jan. 1985
MSC-20448 **Vol. 8, No. 3, P. 389**
Thermal Radiation Analyzer System TRASYS II solves radiation related aspects of thermal analysis problems. TRASYS II provides for calculation of internode radiation interchange data and for calculation of incident and absorbed heat rate data originating from environmental radiant heat sources. When TRASYS II used in conjunction with generalized thermal analysis program such as Systems Improved Numerical Differencing Analyzer (SINDA), any thermal problem expressed in terms of lumped parameter RC thermal network solved.

B84-10134
DATA-GENERATING PROGRAM FOR ASKA MODELING
A. KARIMI-DECHESH (Rockwell International Corp.) and T. K. CHENG (Rockwell International Corp.)
Jan. 1985
MSC-20644 **Vol. 8, No. 3, P. 390**
Carrier plate assemblies of NASA Space Shuttle thermal protection system provided for easy access to protected vital parts of Shuttle. Each assembly mounted on substructure with fasteners through holes in protective tiles. Automatic System of Kinematic Analysis (ASKA) finite-element program evaluates these assemblies. PLATEFORT computer program developed as data generator for ASKA modeling. PLATEFORT greatly reduces amount of time and data required for building ASKA model of these assemblies.

B84-10135
TRANSIENT RESPONSE ANALYSIS
L. D. BLACKMAN (Rockwell International Corp.)
Jan. 1985
MSC-20590 **Vol. 8, No. 3, P. 390**
Transient Response Analysis Program, TRAP aids in

analysis of frequency response of force-transmission and shock-damping devices. Devices analyzed with TRAP include hydraulic actuators, automotive shock absorbers and electromechanical actuators.

B84-10136
PREWHIRL JET MODEL
S. Y. MENG (Rockwell International Corp.), M. JENSEN (Rockwell International Corp.), and E. D. JACKSON
Jan. 1985
MFS-19826 **Vol. 8, No. 3, P. 390**
Simple accurate model of centrifugal or rocket engine pumps provides information necessary to design inducer backflow deflector, backflow eliminator and prewhirl jet in jet mixing zones. Jet design based on this model shows improvement in inducer suction performance and reduced cavitation damage.

B84-10137
MEASURING SIDE LOADS ON BOLTS
T. O. KILGROVE (CALTECH)
Jan. 1985
NPO-15705 **Vol. 8, No. 3, P. 390**
Side loads on clevis bolt measured quickly and easily. Such loads introduced during assembly of bolt and affect operation. Now, unwanted loads determined quantitatively and corrected.

B84-10138
EDDY-CURRENT REFERENCE STANDARD
H. H. AMBROSE JR. (Rocwkwell International Corp.)
Jan. 1985
MFS-19824 **Vol. 8, No. 3, P. 391**
Magnetic properties of metallic reference standards duplicated and stabilized for eddy-current coil measurements over long times. Concept uses precisely machined notched samples of known annealed materials as reference standards.

B84-10139
FLEXIBLE LIQUID-TRANSPORT TUBE
E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15761 **Vol. 8, No. 3, P. 391**
Flexible tube with zipper type arrangements of U-shaped side ribs and top plates allows liquids both transported and removed.

B84-10140
CONSERVING PURGE GASES
K. KAN (Rockwell International Corp.), L. BLEWETT (Rockwell International Corp.), and T. NELSON (Rockwell International Corp.)
Jan. 1985
MFS-19625 **Vol. 8, No. 3, P. 391**
Two-step flow control adjusts to dimensional changes in purged equipment. Two pressure actuated valves provide two-step control. When turbopump starts, helium flows through both valves. As pump operates its parts expand, clearance decrease and back pressure builds up on valves. At preset back pressure value, one valve closes, reducing helium flow.

B84-10141
SELECTING FLATPACK LEAD-FORMING DIES
E. L. CHOATE (Honeywell, Inc.)
Jan. 1985
MFS-25951 **Vol. 8, No. 3, P. 391**
Optical instrument accurately records unformed lead offset for each flatpack and provides better fit of flatpack to printed wiring board.

B84-10142
COILABLE-COLUMN DEVELOPMENT
P. R. PREISWERK (Astro Research Corp.), L. A. DINLEY (Astro Research Corp.), and K. KNAPP (Astro Research Corp.)
Jan. 1985
MFS-27032 **Vol. 8, No. 3, P. 391**
Design changes for longeron columns allow fabrication of larger structures.

B84-10143
MAINTAINING CONSTANT LOAD CELL TEMPERATURE
G. D. VAN MARK (Beech Aircraft Corp.)
Jan. 1985
MSC-20333 **Vol. 8, No. 3, P. 391**
Thermal insulation and temperature compensation device maintains constant temperature environment for load cells. At constant temperature, cells measure weight accurately and repoducibly.

B84-10144
DETECTION OF GAS SLUGS IN HEAT PIPES
J. A. JONES (CALTECH)
Jan. 1985
NPO-16064 **Vol. 8, No. 3, P. 391**
Temperature sensing system detects presence of gas slugs in heat pipes. System designed for operation between zero and 70 degrees C and detects noncondensable pockets of gas that result from decomposition of ammonia cooling fluid. Slugs 1 in. (25mm) in length detected.

B84-10145
A POSITIVE-SHUTOFF FUEL VALVE
J. TOLPEN (Rockwell International Corp.)
Jan. 1985
MFS-19779 **Vol. 8, No. 3, P. 392**
Pneumatically actuated ball valve utilizes continuous contact ball seat seals and dynamic delta seals in lieu of bellows to seal against low pressure leads in fuel supply lines.

B84-10323
X-RAY DETERMINATION OF WELD MISALINEMENT
C. W. NELSON (Beech Aircraft Corp.)
Apr. 1985
MSC-20418 **Vol. 8, No. 4, P. 507**
Simple technique uses ordinary X-ray equipment. Weld line between hemispheres of hidden spherical pressure vessel examined for misalinement between hemispheres. Central X-ray tangent to pressure vessel at weld line. Technique not limited to spheres. Also used to check alinement between insulated sections of pipelines or chemical-reaction vessels without removing insulation or interrupting flow or process.

B84-10324
INSULATION DEBOND DETECTION
G. D. JOHNSTON, A. D. COLEMAN, J. N. PORTWOOD, J. M. SAUNDERS, and A. J. PORTER
Apr. 1985
MFS-25862 **Vol. 8, No. 4, P. 508**
Load-cell and acoustic responses indicate bonding condition nondestructively. Signal recorded by load cell direct and instantaneous measure of local stiffness of material at point of impact. Separate and distinctly different measurement that sensed by microphone. Spectrum analysis of pulse obtained from debonded point will only show frequencies below 425 Hz because insulation alone does not have stiffness to support energy at higher frequencies.

B84-10325
DETERMINING THERMAL DIFFUSIVITIES OF RADIATING SPECIMENS
C. WOOD (CALTECH), R. A. LOCKWOOD (CALTECH), and K. SHIMADA (CALTECH)
Apr. 1985
NPO-15436; NPO-15441 **Vol. 8, No. 4, P. 509**
Two heat-pulse techniques eliminate uncertainties due to radiation losses. Flashlamp supplies pulse of heat to one side of specimen. Temperatures of illumninated surface

and of opposite surface monitored photometrically. In second method, pulse of electrons supplies heat to one side of specimen. Temperature of opposite side monitored by photon detector. Techniques needed because radiation heat losses in this temperature range introduce uncertainties into conventional heat-flux measurements.

B84-10326
HIGH-PRESSURE COUPLING FOR OPEN-ENDED TUBES
A. N. ANDERSON (Rockwell International Corp.)
Apr. 1985
MSC-20451 **Vol. 8, No. 4, P. 510**

Temporary fitting easily installed and removed without damage to tubes. Tube-end pressure coupling consists of few parts easy to install and remove. Couplings useful mainly for repeated temporary connections necessary for high pressure testing or prestressing of tubes with finished ends.

B84-10327
BRAZING ALLOYS INDICATE TURBOMACHINERY TEMPERATURES
J. W. SCHLAFF (Rockwell International Corp.)
Apr. 1985
MFS-19792 **Vol. 8, No. 4, P. 511**

Foils serve as consumable thermometers. Stainless-steel tab with circular window holds brazing-foil sample in place. Tab tacked to object to be tested with capacitive-discharge spot welder operating in range 10 + 1 joules. After measurements, tabs and samples chiseled off, leaving tested object fairly well intact. Technique used on objects made of alloys with iron, nickel, or cobalt as principal ingredients.

B84-10328
OVER-THE-WING PROPELLER REDUCES WING DRAG
J. L. JOHNSON JR. and R. WHITE (Kentron International, Inc.)
Apr. 1985
LAR-13134 **Vol. 8, No. 4, P. 512**

Airflow favorably altered if propeller placed above and behind wing. Relocating propeller induces flow over wing airfoil leading edge, which produces leading-edge suction forces not usually attainable by wing in free-stream flow. Concept reduced drag significantly on aircraft model in 12-foot (3.7-meter) wind tunnel. Relocation also helps to reduce cabin noise.

B84-10329
REUSABLE THERMAL BARRIER FOR INSULATION GAPS
C. E. SALADEE (Rockwell International Corp.)
Apr. 1985
MSC-20519 **Vol. 8, No. 4, P. 512**

Filler composed of resilient, heat-resistant materials. Thermal barrier nestles snugly in gap between two tiles with minimal protrusion beyond faces of surrounding tiles. When removed from gap, barrier springs back to nearly original shape. Developed for filling spaces between tiles on Space Shuttle, also used in furnaces and kilns.

B84-10330
DIFFERENTIAL PRESSURE HELPS SEAL BALL VALVE
J. K. MANGIALARDI (General Electric Co.)
Apr. 1985
MSC-20615 **Vol. 8, No. 4, P. 513**

Leakage suppressed despite O-ring wear. New design eliminates leakage in vacuum selector valve on Space Shuttle waste-control subsystem. Applied to improve sealing in laboratory and industrial vacuum systems and other plumbing involving switching among lines with pressure differentials of order of 1 atmosphere (0.1 MPa).

B84-10331
SPECIMEN HOLDER FOR ANALYTICAL ELECTRON MICROSCOPES
U. S. CLANTON, A. M. ISAACS (Lockheed), and I. MACKINNON (Microbeam)
Apr. 1985
MSC-20398 **Vol. 8, No. 4, P. 514**

Reduces spectral contamination by spurious X-ray. Specimen holder made of compressed carbon, securely retains standard electron microscope grid (disk) 3 mm in diameter and absorbs backscattered electrons that otherwise generate spurious X-rays. Since holder inexpensive, dedicated to single specimen when numerous samples examined.

B84-10332
IMPROVED COULOMB-FRICTION DAMPER
G. E. CAMPBELL (Rockwell International Corp.)
Apr. 1985
MSC-20505 **Vol. 8, No. 4, P. 515**

Equal damping provided on forward and reverse strokes. Improved damper has springs and wedge rings symmetrically placed on both ends of piston wedge, so friction force same in both directions of travel. Unlike conventional automotive shock absorbers, they resemble on outside, both versions require no viscous liquid and operate over wide temperature range.

B84-10333
FUEL-CONSERVATIVE DESCENTS USING A PROGRAMABLE CALCULATOR
C. E. KNOX
Apr. 1985 See Also TP-2085 (N83-17535/NSP)
LAR-13138 **Vol. 8, No. 4, P. 515**

Airborne descent algorithm used with or without time constraints. Concepts provide fuel savings by matching airplane arrival flow to airport acceptance rate through time control computations and allowing pilot to descend at his descretion from cruise altitude to designated metering fix in idle-thrust clean (landing gear up, flaps, zero, and speed brakes retracted) configuration. Also used for planning fuel-conservative descents when time is not consideration.

B84-10334
STING-MOUNTED FLOW SURVEY APPARATUS
G. C. ASHBY JR.
Apr. 1985
LAR-13157 **Vol. 8, No. 4, P. 516**

Flow survey instrumentation integral part of model support system. Drive motor, limit switches, and position transducer contained within streamlined housing and operable in near vacuum wing-tunnel environment. Sting-mounted system has advantages over conventional wall-mounted flow-field survey equipment, include more efficiently utilized run time, higher position accuracy, and fewer runs to map flow field.

B84-10335
DYNAMIC CALIBRATION OF PRESSURE TRANSDUCERS
R. W. HESS, W. T. DAVIS, and P. A. DAVIS
Apr. 1985 See Also NASA TM-85687 (N84-10538/NSP)
LAR-13094 **Vol. 8, No. 4, P. 517**

Sinusoidal calibration signal produced in 4- to 100-Hz range. Portable oscillating-pressure device measures dynamic characteristics of pressure transducers installed in models or aircraft at frequency and oscillating-pressure ranges encountered during unsteady-pressure-measurement tests. Calibration is over range of frequencies and amplitudes not available with commercial acoustic calibration devices.

B84-10336
ACOUSTO-OPTIC EXTENSOMETER FOR BOLTS
J. MARAM (Rockwell International Corp.) and G. KUHR (Rockwell International Corp.)
Apr. 1985
MFS-19914 **Vol. 8, No. 4, P. 518**

Bolt torque or tension deduced from non contacting measurements. Pulsed Laser induces shockwave in bolthead while continuous-wave acousto-optic detector monitors distortion produced by shock. Shock travel time measured

to determine bolt length. Solid-state position detector relatively inexpensive and keeps down cost of extensometer.

B84-10337
INTEGRATED EXHAUST-GAS-ANALYSIS SYSTEM
R. ANDERSON and R. SUMMERS
Apr. 1985 See Also NASA TM-81592 (N81-23435/NSP)
LEW-14062 **Vol. 8, No. 4, P. 519**

Gas-Analysis system includes eight commercial gas analyzers and data-processing and calibration electronics. Two microprocessors range analyzers, calibrate system, process raw data to units of concentration, and make all system information available to facility research computer and to operator. After initial setup, system operates several hours without significant operator attention. Saves considerable operator time.

B84-10338
MULTIPURPOSE PHOTONIC TRANSDUCERS
E. R. DU FRESNE (CALTECH) and W. L. DOWLER (CALTECH)
Apr. 1985
NPO-15135 **Vol. 8, No. 4, P. 520**

Features include smallness and noise immunity. Photonic transducer is interferometer with two arms. Small relative axial motions of mirrors detected as shifts in interference pattern. Version measures temperature changes via differential expansion or contraction of stalks. New transducers smaller (typical size less than 1 cm) and coupled to monitoring equipment with optical fibers instead of wires. Well suited to biomedical instrumentation.

B84-10339
DERIVING STRAIN MODES FROM VIBRATIONAL TESTS
J. W. YOUNG (Structural Dynamics Research Corp.) and J. C. JOANIDES (Rockwell International Corp.)
Apr. 1985
MSC-20587 **Vol. 8, No. 4, P. 521**

Measurements and theoretical analysis complement each other. Experimental acceleration and strain data used to calculate coefficients of low-frequency vibrational modes of object under test. An iterative comparison of experimental and calculated strains give modal model of improved accuracy that predicts strains under operating conditions. Method useful in fatigue life and reliability analyses of buildings, pumps, engines, vehicles, and other systems subject to vibrations and loud noises during operation.

B84-10340
ACTIVE PULSE SUPPRESSION OF STRUCTURAL VIBRATIONS
F. UDWADIA (CALTECH)
Apr. 1985
NPO-15788 **Vol. 8, No. 4, P. 522**

Corrective opposing vibrations reduce Earthquake damage. Algorithm for controlling reactions of buildings and other structures to Earthquake initiates counterpulses when incoming shock pulses exceed threshold level. By using 'go/no-go' criterion rather than continuously adjusting response to every input excitation no matter how small, control system needs less computation effort than comparable closed-loop systems.

B84-10341
CONSTANT-OPERATING-RESISTANCE HOT-WIRE PROBE
P. C. STAINBACK
Apr. 1985
LAR-13144 **Vol. 8, No. 4, P. 523**

Effects of lead-wire-resistance changes with temperature nullified. Constant-operating-resistance hot-wire probe uses two sets of leads. Exposed to identical conditions, comparison of resistance gives change in sensing element itself. Data taken in more convenient manner, with advantage of not having to constantly check for possible changes in lead resistance and consequently readjust potentiometer.

B84-10342
HOT-WIRE PROBE FOR COMPRESSIBLE SUBSONIC FLOW
P. C. STAINBACK, C. B. JOHNSON, and C. B. BASNETT (SDC)
Apr. 1985
LAR-13051 **Vol. 8, No. 4, P. 524**

Probe measures velocity, density, and total temperature fluctuations. Three-wire probe used with each wire operating at different overheat ratio. Technique extendable into transonic and low supersonic flow regimes without difficulty except for those problems usually associated with lengthy calibration and possible wire breaking.

B84-10343
MEASURING THE LIQUID CONTENT OF A GAS
D. H. BEEKMAN (Martin Marietta Corp.) and L. H. METHNER (Martin Marietta Corp.)
Apr. 1985
MFS-25990 **Vol. 8, No. 4, P. 525**

Instrument is adaptation of hot-wire anemometer. Hot-wire anemometer detects liquid droplets entrained in flowing gas. Droplets impinge on probe and carry away heat as vaporized. Power required to maintain probe at constant resistance and elevated temperature gives measure of amount of liquid present. Instrument used in steam turbines to check for condensation and detect fog at airports and highways, generating control signal to turn on fog lights.

B84-10344
CONTINUOUS-FILAMENT ISOGRID COMPOSITE PANEL
J. G. WILLIAMS, R. J. PALMER (McDonnell Douglas Corp.), and A. T. TUCCI (McDonnell Douglas Corp.)
Apr. 1985
LAR-12975 **Vol. 8, No. 4, P. 527**

Damaged panels do not fail catastrophically when fabricated this way. Isogrid stiffener formed in slotted silicon-rubber tool. At grid intersections, slots offset to prevent excessive buildup of composite material and widened to give room for overlapping filaments to spread when compressed. Following total failure of skin, isogrid stiffener still carries 350 kN/m (2,000 lb/in.) and remains intact.

B84-10345
THERMAL-BALANCE STRIP FOR FLUTED LFC PANELS
P. BONO (McDonnell Douglas Corp.)
Apr. 1985
LAR-12991 **Vol. 8, No. 4, P. 527**

Waviness of less than 0.004 inch achieved using titanium strips. Process uses titanium balancing strips to keep waviness within 0.004inch limit. Balancing strips reduce thermal bonding stresses on lower fiberglass fluted sections and placed so fiberglass ends up sandwiched between porous titanium skin and titanium balance strip. Method requires less skill and less labor intensive than composite-wrapped-mandrel method.

B84-10346
SILICONE-RUBBER TOOLING FOR HOLLOW PANELS
F. H. GALLIMORE (McDonnell Douglas Corp.)
Apr. 1985
LAR-12974 **Vol. 8, No. 4, P. 527**

Wave-free contour surface obtained by using flexible mold. Silicone-rubber layup tool, when used in conjunction with hard plastic laminating mold defining desired contour, produces panel with wave-free surface that accurately reproduces shape of mold. In addition to providing porous hollow-panel wing structure that acts as duct for transporting sucked boundary layer tooling, also used to fabricate high-strength lightweight door panels and any single-or compound-contour panel.

B84-10347
QUICK-CHANGE HOLDER FOR AERONAUTICAL-RESEARCH MICROPHONES

R. COHN
Apr. 1985
FRC-11072 **Vol. 8, No. 4, P. 528**
Mounting holds microphone flush with aircraft surface and maintains pressure seal. Microphones, which measure dynamic pressure and shock waves as they pass over aircraft fuselage or other experimental body, mounted through fuselage flush with outside surface. Besides being faster and easier to use than older mounts, new mount prevents damage to microphone on removal because no sealant to be cut and scraped away.

B84-10348
MICROPHONE DETECTS BOILER-TUBE LEAKS
S. P. PARTHASARATHY (CALTECH)
Apr. 1985
NPO-16027 **Vol. 8, No. 4, P. 529**
Unit simple, sensitive, rugged, and reliable. Diaphragmless microphone detects leaks from small boiler tubes. Porous plug retains carbon granules in tube while allowing pressure changes to penetrate to granules. Has greater life expectancy than previous controllers and used in variety of hot corrosive atmospheres.

B84-10349
IN-PLACE CALIBRATION OF INSTRUMENTATION MICROPHONES
R. B. COHN (Dryden Flight Research Facility)
Apr. 1985
ARC-11463 **Vol. 8, No. 4, P. 530**
Accidental damage and decalibration prevented. Linearity, sensitivity, and frequency response of microphone measured with commercial sound generator modified so placed directly over or under microphone. Artificial voice connected to oscillator and measuring amplifier. Requisite frequencies and sound pressures applied to microphone, and microphone output recorded. New calibration method used on aircraft and wind-tunnel microphones.

B84-10350
SYNCHRONOUSLY DEPLOYABLE TRUSS
H. G. BUSH, M. K. MIKULAS JR., and R. E. WALLSOM (Kentron International, Inc.)
Apr. 1985
LAR-13117 **Vol. 8, No. 4, P. 531**
Double-layered truss structure compactly packaged and sychronously deployed. Synchronously deployable truss constructed of two surface layers of struts, arranged in triangles, connected by 'tripods' of equal-length core struts. Mechanism powered by passive spring and damped by hydraulic-damping cylinder. When released, spring drives slider linked to core and surface struts. Variety of truss geometries, including curved structures, comtemplated.

B84-10351
DEPLOYABLE GEODESIC TRUSS
M. M. MIKULAS JR., M. D. RHODES, and J. W. SIMONTON
Apr. 1985
LAR-13113 **Vol. 8, No. 4, P. 532**
Efficiently packaged structure deployed or retracted easily. In preliminary two-bay model each bay has sets of battens connected by two longitudinal crossed members that give bay axial and torsional stiffness. Cross-members hinged in center to fold for packaging. Bays deployed and stabilized by actuators connected between center hinges of cross-members.

B84-10352
ADJUSTABLE MOUNT
E. A. CROSSLEY, H. C. JONES, D. P. HAYNES, and I. W. JONES
Apr. 1985
LAR-13100 **Vol. 8, No. 4, P. 534**
Remotely-controlled adjustable mount operates in vacuum environments. Mount consists of jacking-screw arrangement to control vertical direction. Gear-driven lead screw controls other horizontal direction, while rack-and-pinion gears control azimuth and pitch. Adjustments made independently of each other.

B84-10353
GAS-DENSITY GAGE
W. BERNSTERIN (William Marsh Rice University) and J. MCGARITY (William Marsh Rice University)
Apr. 1985
MFS-28011 **Vol. 8, No. 4, P. 534**
Lightweight density gage that operates over broad pressure range accurately measures gas pressures.

B84-10354
CAPTURE-RANGE INDICATOR
C. HELLER
Apr. 1985
MFS-28008 **Vol. 8, No. 4, P. 534**
Position indicator allows rapid positioning and linkage of payloads. Device shortens capture time and provides less-stressful linkage on operator.

B84-10355
MEASURING CLEARANCE INDIRECTLY
W. C. JOHNSON (Rockwell International Corp.) and B. O. WESTBERG (Rockwell International Corp.)
Apr. 1985
MFS-19875 **Vol. 8, No. 4, P. 534**
Plot of deflection versus load indicates clearance between internal pins and wall.

07 MACHINERY

B84-10146
STEPPED-PIN CLEVIS RESISTS JAMMING
T. O. KILLGROVE (CALTECH)
Jan. 1985
NPO-15834 **Vol. 8, No. 3, P. 395**
Pin modification allows pyrotechnic release devices to operate more smoothly. New clevis pin has stepped diameters to prevent bending as it exits yoke. In contrast, conventional unstepped clevis pin bends and jams as it is withdrawn. Stepped pin design suitable for explosive and possible hammer driven pin sullers.

B84-10147
FORKLIFT SUPPORT DOLLY
W. YOUNG (A. & M. Machine Co.) and H. C. WITCHER
Jan. 1985
GSC-12916 **Vol. 8, No. 3, P. 396**
Long, heavy loads handled safely. Forklift support dolly enables operator to manipulate safely large sections of materials around corners and through narrow aisles and doorways. Dolly has pivoting tandem wheels for maneuverability. Plate laid out lengthwise along truck axis, with one end clamped to forklift and other end clamped to dolly. With this arrangement, minimum width of passage determined by short side of plate rather than by long side.

B84-10148
FASTER RESPONSE FOR MEMORY-METAL ACTUATORS
C. F. RUOFF (CALTECH)
Jan. 1985
NPO-16120 **Vol. 8, No. 3, P. 396**
Cooling accelerated by attaching Peltier junction. Electric current carries heat to or from junction between two dissimilar metals, direction of heat flow depending on direction of current and particular metals used. Direction of

current is opposite to that of same two metals operating as thermocouple.

B84-10149
SEALING MECHANICAL CRYOGENIC COOLERS
R. RICHTER (CALTECH)
Jan. 1985
NPO-15139 **Vol. 8, No. 3, P. 397**
Metal bellows used to seal Vuilleumier and Stirling-cycle cryogenic coolers, replacing sliding seals that failed after only 3,000 hours of service. Metal bellows, incorporated in displacer design provide nonrubbing dynamic seal. Lifetime of cryogenic cooler no longer limited by loss of sealing material and by deterioration of regenerators due to clogging by seal debris.

B84-10150
VACUUM SEAL PERMITS LIMITED ROTATION
F. LOMBARDI (CALTECH)
Jan. 1985
NPO-15115 **Vol. 8, No. 3, P. 398**
Flexible metal seal permits rotation of object in vacuum chamber. Seal made from two cylindrical azimuthally fluted bellows attached to ends of cylindrical axially fluted bellows with connecting tubes at both ends. Designed for rotation of sample probes in electron spectroscopy for chemical analysis (ESCA), other applications likely.

B84-10151
AUTOMATIC COAL-MINING SYSTEM
E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15861 **Vol. 8, No. 3, P. 398**
Coal cutting and removal done with minimal hazard to people. Automatic coal mine cutting, transport and roof-support movement all done by automatic machinery. Exposure of people to hazardous conditions reduced to inspection tours, maintenance, repair, and possibly entry mining.

B84-10152
THE EFFECT OF WIND ON THE AERODYNAMIC RESISTANCE OF HIGHWAY VEHICLES
B. DAYMAN JR. (CALTECH)
Jan. 1985
NPO-14771 **Vol. 8, No. 3, P. 399**
CARYAW predicts effects of wind on aerodynamic resistance of vehicles. Determines effect of winds on fuel consumption and determines effects of vehicle speed on fuel consumption for wide variety of wind conditions.

B84-10153
STANDARD FASTENER LIBRARY
J. J. TEJWANI (Rockwell International Corp.), T. R. KELLY (Rockwell International Corp.), and M. L. MARKE (Rockwell International Corp.)
Jan. 1985
MSC-20645 **Vol. 8, No. 3, P. 400**
Program for use with graphics system creates library of standard fastener hardware. Programs categorized by fastener geometric shape with tabulated sizes. Fastener details recalled by configuration and size for insertion into drawing on screen. Program used in production of engineering drawings for Space Shuttle orbiter.

B84-10154
AERODYNAMIC DESIGN OF ROAD VEHICLES
D. W. KURTZ (CALTECH)
Jan. 1985 See Also NASA CR-163744 (N81-12943/NSP)
NPO-15474 **Vol. 8, No. 3, P. 400**
Guidebook discusses design of road vehicles to reduce aerodynamic drag. Book presents strategy for integrating aerodynamic design into vehicle design. Book written for readers lacking experience in aerodynamics.

B84-10155
INEXPENSIVE PRESSURE-RELIEF VALVE
E. A. THEORDORE (Rockwell International Corp.)
Jan. 1985
MSC-20518 **Vol. 8, No. 3, P. 400**
Simple device vents excess low-pressure gas. Inexpensive pressure relief valve built from polyvinylchloride pipe. Valve suitable for low pressure-- 25 to 50 cm of mercury--and flow rates up to 14 m3/min.

B84-10156
BOLT INSERTS FOR LIGHTNING PROTECTION
K. O. HAMBROCK (Martin Marietta Corp.)
Jan. 1985
MFS-25918 **Vol. 8, No. 3, P. 400**
Stainless steel bolt fasteners have adequate grounding paths for protection of structures against lightning strikes. Fasteners particularly useful in sections where insulating material required, such as thermal panels of external storage tank.

B84-10157
SOLAR-POWERED FLYWHEEL
F. J. NOLA
Jan. 1985
MFS-25978 **Vol. 8, No. 3, P. 400**
Energy-storage system has 20 year lifetime. Electrical power source consisting of flywheel and electronic control system stores solar energy. Flywheel developed for space vehicles features good weight-to-energy storage ratios and used as control gyroscope for maneuvering.

B84-10158
CLAMP SECURES MATERIAL TO CYLINDER BASE
Y. S. TAM (Rockwell International Corp.)
Jan. 1985
MFS-19479 **Vol. 8, No. 3, P. 400**
Two-part clamp assembled around pipe or post, ends not free. Resistance welding clamp to post and locking ring to lower part of clamp permanently fixes clamp in place, preventing thermal cycling from loosening clamp.

B84-10159
REMOTELY OPERATED GRIPPER TRACKS APPLIED FORCE
G. C. BURNS (McDonnell Douglas Corp.)
Jan. 1985
MSC-20241 **Vol. 8, No. 3, P. 401**
Operator 'feel' incorporated into new design. Remotely controlled gripper grasps holds, and maneuvers items not equipped with grapple fixture and no preplanned interface with gripper.

B84-10160
PILLAR-TRIMMING SYSTEM
E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15848 **Vol. 8, No. 3, P. 401**
Trimming and reinforcing of coal pillars allows more coal recovery. Conceptual coal-pillar trimming machine use two counterrotating cutting drums to take corners off roof support pillars in coal mines.

B84-10161
PERFORMANCE TESTING OF THE DOE ELECTRIC TEST VEHICLE
D. W. KURTZ (CALTECH), J. A. BRYANT (CALTECH), and T. W. PRICE (CALTECH)
Jan. 1985
NPO-15660 **Vol. 8, No. 3, P. 401**
Report describes total system testing and evaluation of electrically powered automobile.

B84-10162
INERT-GAS ELECTRICAL DISCHARGE MACHINING
V. RAMANI (Rockwell International Corp.) and M. L.

CASSIDENTI (Rockwell International Corp.)
Jan. 1985
MFS-19778 **Vol. 8, No. 3, P. 401**
Holes in complicated hardware successfully drilled by dry EDM process that uses tubular copper electrode and argon or helium gas as dielectric medium.

B84-10163
COUNTERSINK DRILL
R. J. HERNANDEZ (Rockwell International Corp.)
Jan. 1985
MFS-19852 **Vol. 8, No. 3, P. 401**
Efficient drill design for countersinking or metal drilling uses only two flutes instead of three and made of carbide instead of 'high-speed' steel. Tool performance and service life increased.

B84-10164
TWO-PHASE WET/DRY ENGINE FOR WASTE-HEAT RECOVERY
D. G. ELLIOTT (CALTECH)
Jan. 1985
NPO-15621 **Vol. 8, No. 3, P. 401**
Novel supersonic fluid expansion nozzle used to vaporize toluene (or other drying-type organic liquid) by expansion through two-phase region to drive impulse turbine in Rankine-cycle engine.

B84-10165
KICK-FREE PRESSURE RELEASE VALVE
T. O. KILLGROVE (CALTECH)
Jan. 1985
NPO-16078 **Vol. 8, No. 3, P. 402**
Release valve for smoothly venting buildup of gas pressure modified to reduce kickback of mechanism during discharge.

B84-10166
MAGNETIC DESPINNING SYSTEM
G. F. VON TIESENHAUSEN
Jan. 1985
MFS-25966 **Vol. 8, No. 3, P. 402**
Electrical coil reduces spinning and tumbling speed of orbiting satellites through eddy-current braking. Induction of eddy currents into skin of satellite by electromagnetic field produces torques that oppose rotation.

B84-10167
MEMORY-METAL STEPPING MOTOR
R. S. JAMIESON (CALTECH)
Jan. 1985
NPO-15482 **Vol. 8, No. 3, P. 402**
Compact stepping motor for applications requiring high torque at slow speeds made with helical spring clutch and electrically-heated memory-metal actuator.

B84-10168
DIVERTER LIP FOR SEAL
E. JACKSON III (Rockwell International Corp.) and D. JOHNSON (Rockwell International Corp.)
Jan. 1985
MFS-19891 **Vol. 8, No. 3, P. 402**
Proposed one-piece design change for cooling turbine rotor disks eliminates temperature differential that normally causes thermal stresses and cracks.

B84-10169
MEASURING THE RUNOUT ON A ROTARY SHAFT
R. BEATTY (Rockwell International Corp.) and J. FENWICK (Rockwell International Corp.)
Jan. 1985
MFS-19694 **Vol. 8, No. 3, P. 402**
Runout on shaft such as on pump shaft in liquid oxygen environment measured by device employing pair of pistons placed 90 degrees apart and in contact with shaft.

B84-10356
SAFETY PEDAL FOR FOOT-OPERATED MACHINERY
G. D. GARCIA (Rockwell International Corp.)
Apr. 1985
MSC-20535 **Vol. 8, No. 4, P. 537**
Ninged structure prevents inadvertent use. Forward motion of foot on yoke plate necessary to operate brake pedal. Downward force on yoke plate turns locking/releasing laver, which then pushes locking pin into indexing hole. New pedal improves both productivity and safety of power brakes and such other machines as metal shearers and punch presses.

B84-10357
BRIDLE ATTACHMENT FOR AIRCRAFT SPIN-RECOVERY PARACHUTE
W. L. WHITE
Apr. 1985
LAR-13076 **Vol. 8, No. 4, P. 538**
Antispin rolling moment produced by chute drag force. Parachute stowed prior to deployment. At deployment, bridle attachment produces antispin rolling moment. At recovery, parachute forces are in aircraft plane of symmetry. Attachment system reduces parachute diameter typically required for spin recovery of experimental aircraft during harzardous flight testing.

B84-10358
COMPACT ANTISPIN PARACHUTE SYSTEM
R. D. WHIPPLE
Apr. 1985
LAR-12979 **Vol. 8, No. 4, P. 539**
Costs and complexity of parachute system greatly reduced. Rigid towline parachute system operates in three steps: (1) When aircraft begins to spin, parachute compartment opened up, and parachute unfolds; (2) Parachute deployed and spin terminated; and (3) Parachute released. Advantage of towline system allows use of much smaller parachute, reducing design loads on structural reinforcement. Also, complex pyrotechnic-deployment or jettison systems no longer necessary.

B84-10359
GARTER VALVES
P. JENCEK (Rockwell International Corp.)
Apr. 1985
MFS-19899 **Vol. 8, No. 4, P. 540**
Small subvalves opened and closed simultaneously. Precisely-machined mating rings act as valves. Rings seal against each other to stop fluid flow. Rings deformed or moved relative to each other to uncover holes and permit flow. Valve controls flow rate of fuel into burner.

B84-10360
DEGREASER REDUCES SOLVENT LOSS
E. R. DU FRESNE (CALTECH)
Apr. 1985
NPO-16128 **Vol. 8, No. 4, P. 541**
Escape of solvent minimized by second cooling coil. Degreaser suppresses solvent-vapor loss through parts-basket dragout and air drafts. Within CO2 blanket, convection repeatedly exposes CO2/solvent mixture to cold spot created by CO2 coil. Solvent vapor condenses, then runs down via through to cold tank. This small expenditure of CO2 minimizes health and environmental hazards.

B84-10361
TAPERED RING SEAL
D. P. FLEMING
Apr. 1985 See Also NASA TP-1646 (N80-19495/NSP)
LEW-10455 **Vol. 8, No. 4, P. 541**
Centering force maximized by decreased seal clearance in flow direction. Increased centering force prevents contact between seal and shaft, eliminating seal wear. Ring seals used to restrict fluid leakage between rotating shaft and

nonrotating housing. Seal used in Space Shuttle main engine oxygen pump.

B84-10362
REACTIONLESS WINCH
B. E. BOSWELL (McDonnell Douglas Corp.)
Apr. 1985
MSC-20440 **Vol. 8, No. 4, P. 542**

Hand-held tool serves variety of uses. Housing of Winch includes simple controls and reaction handle that serves as stowage for ratchetingcrank handle. Winch used by divers working underwater. Also used for pulling vehicles out of mud, lifting heavy objects, or tightening cables.

B84-10363
REMOTE COUPLING OF ELECTRICAL CONNECTORS
R. T. BARBOUR (Rockwell International Corp.)
Apr. 1985
MSC-20414 **Vol. 8, No. 4, P. 543**

Device alines plug and receptacle axially and radially. Standard multiple-pin plug and socket mounted in mechanism. As threaded shaft moves out from its mounting bracket, two sets of petals engage each other and correct misalinement. Misalinement absorbed by spring-mounted swivels. Designed for umbilical cables between Space Shuttle and payload, mechanism adaptable to other remote or hazardous situations in which human not available to connect mating parts by hand.

B84-10364
TOOL FOR INSERTING AND REMOVING TUBE PLUGS
O. G. MOLINA (Rockwell International Corp.) and A. G. PASCUA (Rockwell International Corp.)
Apr. 1985
MFS-19871 **Vol. 8, No. 4, P. 544**

Simple handtool used with both straight and bent tubes. Plug consisting of two expandable O-rings pushed into or pulled out of tube with this flexible tool. Flexible shaft of tool threaded at inner (plug) end to engage or disengage plug when knurled handle turned. Results exceptionally low friction between shaft and tube. Allows insertion and removal of plug carefully controlled.

B84-10365
IGNITION-SPARK DETECTOR FOR ENGINE TESTING
G. KUHR (Rockwell International Corp.)
Apr. 1985
MFS-19890 **Vol. 8, No. 4, P. 544**

Optical fiber views sparks directly. In fuel or oxidizer tube, optical fiber collects light from ignition spark. Fibers also used to collect light from combustion reactions for spectrographic analysis. Useful in engine testing, detector helps determine reason for engine failure.

B84-10366
HINGED SHIELDS FOR MACHINE TOOLS
J. B. LALLANDE, W. W. POLAND, and S. TULL
Apr. 1985
GSC-12915 **Vol. 8, No. 4, P. 545**

Flaps guard against flying chips, but fold away for tool setup. clear plastic shield in position to intercept flying chips from machine tool and retracted to give operator access to workpiece. Machine shops readily make such shields for own use.

B84-10367
HOLDING CARGO IN PLACE WITH FOAM
T. T. FISHER (Lockheed Missiles & Space Co., Inc.)
Apr. 1985
MSC-20723 **Vol. 8, No. 4, P. 546**

Foam fills entire container to protect cargo from shock and vibration. Originally developed for stowing space debris and spent satellites in Space Shuttle for return to Earth, encapsulation concept suitable for preparing shipments carried by truck, boat, or airplane. Equipment automatically injects polyurethane foam into its interior to hold cargo securely in place. Container of rectangular or other cross section built to match shape of vehicle used.

B84-10368
AUTOMATIC ROBOT SAFETY SHUTDOWN SYSTEM
M. LIRETTE (Martin Marietta Corp.)
Apr. 1985
MFS-25969 **Vol. 8, No. 4, P. 546**

Robot turned off if acceleration exceeds preset value. Signals from accelerometer on robot arm pass through filter and amplifier, eliminating high-frequency noise and hydraulic-pump pulsations. Data digitized and processed in computer. Unit controls other machines that perform repetitive movements, including rotary tables, tracked vehicles, conveyor lines, and elevators.

B84-10369
EDM ELECTRODE FOR INTERNAL GROOVES
V. RAMANI (Rockwell International Corp.) and A. WERNER (Rockwell International Corp.)
Apr. 1985
MFS-19733 **Vol. 8, No. 4, P. 547**

Electroerosive process inexpensive alternative to broaching. Hollow brass electrodes, soldered at one end to stainless-steel holding ring, held in grooves in mandrel. These electrodes used to machine grooves electrically in stainless-steel tube three-eights inch (9.5 millimeters) in diameter. Tool used on tubes already in place in equipment.

B84-10370
SETUP AID FOR ELECTRICAL-DISCHARGE MACHINING
G. LINES (Rockwell International Corp.) and J. DUCA (Rockwell International Corp.)
Apr. 1985
MFS-19874 **Vol. 8, No. 4, P. 548**

Interlock assures that workpiece is correctly assembled in machining fixture. A Plunger in a Hollow Shaft actuates a switch, allowing a power supply to produce current for electrical-discharge machining. Plunger operates only when necessary parts are position.

B84-10371
PROPELLER DESIGN PROGRAM
W. H. PHILLIPS
Apr. 1985
LAR-13141; LAR-13142 **Vol. 8, No. 4, P. 548**

Planform and propeller twist with minimum induced loss calculated. New Theoretical treatment combines classical theories of Betz-Prandtl, Goldstein, and Glauert easily applied to problem of determining propeller blade geometry for minimum induced loss. Analysis applicable at subsonic flight speeds and neglects structural considerations in propeller design.

B84-10372
HYBRID-VEHICLE TRANSMISSION SYSTEM
G. LUPO (Centro Ricerche Fiat S.p.A.) and G. DOTTI (Centro Ricerche Fiat S.p.A.)
Apr. 1985
NPO-16119 **Vol. 8, No. 4, P. 549**

Continuously-variable transmission system for hybrid vehicles couples internal-combustion engine and electric motor section, either individually or in parallel, to power vehicle wheels during steering and braking.

B84-10373
EVENING FLOW DISTRIBUTION THROUGH PARALLEL TUBES
S. C. BRAY (General Electric Co.), P. W. DIETZ (General Electric Co.), and H. JASTER (General Electric Co.)
Apr. 1985
MFS-23936 **Vol. 8, No. 4, P. 549**

Flow nonuniformity in parallel tubes reduced by introducing pressure drops. Total flow maintained and controlled by varying main inletvalve position.

B84-10374
LINEAR BOOM ACTUATOR
E. F. KOCH (CALTECH)
Apr. 1985
NPO-16099 **Vol. 8, No.4, P. 550**
Actuator stabilizes spacecraft spin by varying length of support struts that hold spacecraft booms. Variation changes spin axis and controls wobble. Linear actuator controls spacecraft wobble applicable in rotating systems on Earth.

B84-10375
SAFETY EVALUATION METHODOLOGY FOR MINING SYSTEMS
W. F. ZIMMERMAN (CALTECH)
Apr. 1985
NPO-15831 **Vol. 8, No. 4, P. 550**
Methodolgy evaluates design of proposed mining systems. Analysis tests proposed mining systems against specifications and hazards of existing similar systems, examines soundness of new design in terms of reducing or eliminating major health and safety hazards, and identifies major design weaknesses.

B84-10376
HIGH-TEMPERATURE PUMP
R. R. HALE (CALTECH) and A. R. MCDOUGAL (CALTECH)
Apr. 1985
NPO-15783 **Vol. 8, No. 4, P. 550**
Heat exchanger in water-cooled pumps allows high-temperature operation.

B84-10377
POWER TRAIN FOR HYBRID ELECTRIC VEHICLE
H. C. VIVIAN (CALTECH)
Apr. 1985
NPO-15742 **Vol. 8, No. 4, P. 550**
Power train of hybrid electric vehicle enables internal-combustion engine and electric motor to operate near same constant speed except when off or idling.

B84-10378
ADJUSTABLE TUNING SPRING FOR BELLOWS PUMP
G. L. GREEN (Pan American World Airways, Inc.), D. TU DUC (Pan American World Airways, Inc.), and S. HOOPER (Pan American World Airways, Inc.)
Apr. 1985
MSC-20512 **Vol. 8, No. 4, P. 550**
Adjustable leaf spring increases maximum operating pressure of pump from 2 to over 60 psi (13 to over 400 kN/m2). Small commercial bellows pump using ac-powered electromagnet to vibrate bellows at mechanical resonance modified to operate over wider pressure range.

08 FABRICATION TECHNOLOGY

B84-10170
TWO-CRUCIBLE CZOCHRALSKI PROCESS
G. FIEGL (Siltec Corp.) and W. TORBET (Siltec Corp.)
Jan. 1985
NPO-15110 **Vol. 8, No. 3, P. 405**
Scheme for continuous melt replenishment increases capacity of Czochralski crystal-growing furnace. Replenishing and drawing crucibles of improved Czochralski apparatus connected by heated quartz siphon. When doped silicon added to replenishing crucible, liquid silicon flows into drawing crucible, equalizing two melt levels. Addition of new material automatically controlled in response to optically sensed melt level. Results of this semicontinuous operation higher production speed, lower cost, and good control of crystal quality.

B84-10171
RECIPROCATING SAW FOR SILICON WAFERS
A. D. MORRISON (CALTECH) and E. R. COLLINS JR. (CALTECH)
Jan. 1985
NPO-15863 **Vol. 8, No. 3, P. 406**
Concept increases productivity and wafer quality. Cutting wafers from silicon ingots produces smooth wafers at high rates with reduced blade wear. Involves straight reciprocating saw blade and slight rotation of ingot between cutting strokes. Many parallel blades combined to cut many wafers simultaneously from ingot.

B84-10172
PRODUCTION LINE FOR DENDRITIC-WEB SOLAR CELLS
D. J. PAGE (Westinghouse Electric Corp.)
Jan. 1985
NPO-15098 **Vol. 8, No. 3, P. 407**
Direct inclusion of web-growth furnaces in production line expected to result in lower costs than current production processes using silicon wafers sliced from Czochralski boules. Silicon-web input capacity of line is 0.5 m2/min, which corresponds to total peak-power output of about 25 MW for 1 year of production. Line employs about 18 production people per shift and requires about 3,650 square feet of floorspace.

B84-10173
MACHINING OF SILICON-RIBBON-FORMING DIES
A. A. MENNA (Mobil Tyco Solar Energy Corp.)
Jan. 1985
NPO-15127 **Vol. 8, No. 3, P. 408**
Carbon extension for dies used in forming silicon ribbon crystals machined precisely with help of special tool. Die extension has edges beveled toward narrow flats at top, with slot precisely oriented and centered between flats and bevels. Cutting tool assembled from standard angle cutter and circular saw or saws. Angle cutters cuts bevels while slot saw cuts slot between them. In alternative version, custom-ground edges or additional circular saws also cut flats simultaneously.

B84-10174
AUTOMATICALLY DRESSING BLADES IN SILICON-WAFER CUTTING
A. D. MORRISON (CALTECH)
Jan. 1985
NPO-15745 **Vol. 8, No. 3, P. 408**
Inserts incorporated in support beams for silicon ingots automatically 'dress' cutting blade during wafer slicing. Segments of blade-dressing material placed at regular intervals in graphite beam. Blade cuts into segments and dressed without operator intervention and without interrupting regular machine operation. Manual dressing eliminated, and production rates increased.

B84-10175
HIGH-MOBILITY EPITAXIAL SILICON WAFERS
R. STERMER JR., A. FRIPP JR., A. JONES (Rockwell International Corp.), J. MCMULLEN (Rockwell International Corp.), H. MANASEVIT (Rockwell International Corp.), I. GERGIS (Rockwell International Corp.), and S. SOCLOF (Rockwell International Corp.)
Jan. 1985
LAR-12846 **Vol. 8, No. 3, P. 409**
New technique produces high-mobility multilayer films suitable for use on silicon process line. New material is multilayer film of alternate layers of silicon and alloy of silicon and germanium. Films grown thus far have electron mobilities 50 percent greater than epitaxial silicon films grown previously.

B84-10176
RAPID ADHESIVE BONDING FOR METALS AND COMPOSITES
B. A. STEIN, J. R. TYERYAR, R. L. FOX, S. E. STERLING JR., and J. D. BUCKLEY
Jan. 1985
LAR-13066 **Vol. 8, No. 3, P. 410**

Toroidal induction heater is key element in rapid bonding technique. Rapid adhesive bonding equipment features toroid induction heater for quick bonding of composites and metals. Process avoids damaging composites that cannot withstand high temperatures for long time intervals. Process scaled up for production. Technique suited to bonding of end tabs onto material test specimens.

B84-10177
COLLAPSIBLE AND DEPLOYABLE TRUSSES
R. A. NELSON (Vought Corp.)
Jan. 1985
MFS-25945 **Vol. 8, No. 3, P. 411**

Cable-controlled mechanisms allow large structures stored in small spaces. Combination of telescoping struts and pivot points allows very large structure collapsed into very small one. Concept used not only for straight but for tapered or curved ones as well. Structure adaptable to terrestrial uses as portable towers, scaffolds, and bridge beams folded compactly for transportation or storage.

B84-10178
HOT-DIPPED METAL FILMS AS EPITAXIAL SUBSTRATES
P. J. SHLICHTA (CALTECH)
Jan. 1985
NPO-15904 **Vol. 8, No 3, P. 412**

Multistep process forms semiconductor devices on macrocrystalline films of cadmium or zinc. Solar-cell fabrication processes use hot-dipped macrocrystalline films on low-cost sheet-metal base as substrates for epitaxy. Epitaxial layers formed by variety of methods of alternative sequence paths. Solar cells made economically by forming desired surface substance directly on metal film by chemical reactions.

B84-10179
DECONTAMINATING ALUMINUM/AMMONIA HEAT PIPES
J. A. JONES (CALTECH)
Jan. 1985
NPO-16066 **Vol. 8, No. 3, P. 413**

Internal gas slugs reduced or eliminated. Manufacturing method increases efficiency of aluminum heat pipes in which ammonia is working fluid by insuring pipe filled with nearly pure charge of ammonia. In new process heat pipe initially closed with stainless-steel valve instead of weld so pipe put through several cycles of filling, purging, and accelerated aging.

B84-10180
POLYURETHANE MASKS LARGE AREAS IN ELECTROPLATING
J. L. BEASLEY (Rockwell International Corp.)
Jan. 1985
MFS-19825 **Vol. 8, No. 3, P. 413**

Polyurethane foam provides effective mask in electroplating of copper or nickel. Thin layer of Turco maskant painted on area to be masked: Layer ensures polyurethane foam removed easily after served its purpose. Component A, isocyanate, and component B, polyol, mixed together and brushed or sprayed on mask area. Mixture reacts, yielding polyurethane foam. Foam prevents deposition of nickel or copper on covered area. New method saves time, increases productivity and uses less material than older procedures.

B84-10181
VENTED COMPRESSION MOLDING OF GRANULE-FILLED RESINS
J. O. MCCREE (Martin Marietta Aerospace Corp.) and L. ERWIN (Martin Marietta Aerospace Corp.)
Feb. 1985
MFS-25975 **Vol. 8, No. 3, P. 414**

Resins filled with granules formed to final size and shape in new process. New vented compression molding method takes less time than conventional method. Vacuum-bagging and machining stages eliminated. Part emerges from mold in final size and shape. Suitable for making variety of parts with simple shapes, vented compression molding takes less time and cost less than older processes.

B84-10182
ALINING HEAT-EXCHANGER TUBES FOR ASSEMBLY
K. A. BENSON (Rockwell International Corp.)
Feb. 1985
MFS-19857 **Vol. 8, No. 3, P. 415**

Simple support method makes costly jigs and fixtures unnecessary. 'Dummy' tubes installed at regular intervals to support 'real' tubes before real tubes installed, filled with Cerrobend (or equivalent) material, metallic substance with low melting point, makes dummy tubes rigid so they brace real tubes as installed. When all available spaces for real tubes filled, dummy tubes removed and replaced with real tubes.

B84-10183
BEAM-CAP-FORMING MACHINE
W. MARX (Grumman Aerospace Corp.)
Feb. 1985 See Also CR-170642 (N83-11158/NSP)
MFS-27007 **Vol. 8, No. 3, P. 415**

Graphite reinforced plastic strip transformed into continuous beam cap. Report describes machine that fabricates beam caps from graphite reinforced thermoplastic materials supplied as strip stock.

B84-10184
MATCHING IMPEDANCES AND MODES IN ACOUSTIC LEVITATION
M. B. BARMATZ (CALTECH)
Feb. 1985
NPO-16022 **Vol. 8, No. 3, P. 416**

Temperature differences accommodated with tunable coupler. Report discusses schemes for coupling sound efficiently from cool outside atmosphere into hot acoustic-levitation chamber. Theoretical studies have practical implications for material-processing systems that employ acoustic levitation.

B84-10185
ACOUSTIC LEVITATION WITH ONE DRIVER
T. G. WANG (CALTECH), I. RUDNICK (CALTECH), D. D. ELLEMAN (CALTECH), and J. D. STONEBURNER (CALTECH)
Feb. 1985
NPO-15793 **Vol. 8, No. 3, P. 416**

Report discusses acoustic levitation in rectangular chamber using one driver mounted at corner. Placement of driver at corner enables it to couple effectively to acoustic modes along all three axes. Use of single driver reduces cost, complexity and weight of levitation system below those of three driver system.

B84-10186
PRICE ESTIMATION GUIDELINES
R. G. CHAMBERLAIN (CALTECH), R. W. ASTER (CALTECH), P. J. FIRNETT (CALTECH), and M. A. MILLER (CALTECH)
Feb. 1985
NPO-15569 **Vol. 8, No. 3, P. 417**

Improved Price Estimation Guidelines, IPEG4, program provides comparatively simple, yet relatively accurate estimate of price of manufactured product. IPEG4 processes user supplied input data to determine estimate of price per unit of production. Input data include equipment cost, space required, labor cost, materials and supplies cost, utility

expenses, and production volume on industry wide or process wide basis.

B84-10187
ASSEMBLY-LINE MANUFACTURING INDUSTRY SIMULATION
R. G. CHAMBERLAIN (CALTECH) and P. J. FIRNETT (CALTECH)
Feb. 1985
NPO-16032 **Vol. 8, No. 3, P. 417**
Assists in economic analysis of production line manufacturing. Originally developed to estimate product price received by hypothetical U.S. industry that manufactures silicon solar modules for use in electricity generation, SAMIS extended and generalized to extent that it simulates operation of many different production line manufacturing industries and/or companies.

B84-10188
TWO-PULSE STITCH WELDING
C. J. TORBORG (Honeywell, Inc.)
Feb. 1985
MFS-25716 **Vol. 8, No. 3, P. 418**
Second welding pulse at about 20 percent higher energy repairs bad single-pulse welds. Method used successfully to weld polytetrafluoroethyleneinsulated nickel wire to stainless-steel terminals in back-plane wiring.

B84-10189
SONICALLY-WELDED THERMAL BLANKETS
R. BETTINI (The Perkin-Elmer Corp.) and F. CITRIN (The Perkin-Elmer Corp.)
Feb. 1985
MFS-25806 **Vol. 8, No. 3, P. 418**
Insulating layers joined by seams. Sonic welding saves time and reduces weight. Layers of blanket built up from alternating layers of polyester sheet and polyester net. Paper pattern showing lines along which layers are joined together placed over top layer.

B84-10190
FABRICATION OF THICK GOLD STRIP LINES
C. M. GEE (Hughes Aircraft Co.), H. L. GARVIN (Hughes Aircraft Co.), and K. ROBINSON (Hughes Aircraft Co.)
Feb. 1985
NPO-16238 **Vol. 8, No. 3, P. 418**
Ion-beam etching and masking techniques fabricate micron-sized gold strip lines. Fabricated by use of argon ion-beam milling.

B84-10191
MAGNETIC CHUCK FOR PRECISE GRINDING
R. A. CARVER (Rockwell International Corp.)
Feb. 1985
MFS-19764 **Vol. 8, No. 3, P. 418**
Handling time substantially reduced. Magnetic grinding chuck used for fabricating parts that have thin, delicate geometrics requiring close tolerances.

B84-10192
IMPROVED MELT-LEVEL CONTROL SYSTEM
D. L. MEIER (Westinghouse Electric Corp.)
Feb. 1985
NPO-15900 **Vol. 8, No. 3, P. 418**
Laser feedback control automatically maintains silicon melt levels. During long-term growth of dendritic-web silicon, silicon melt level controlled and held nearly constant using laser feedback system to sense level of melt and control silicon-pellet feed rate.

B84-10193
SILICON-WEB-GROWING MACHINE
C. DUNCAN (Westinghouse Electric Corp.)
Feb. 1985
NPO-15870 **Vol. 8, No. 3, P. 418**
Silicon replenished automatically as web is withdrawn. Semiautomatic silicon-web-growing machine set down in detailed engineering drawings. Melt level sensed with He/Ne laser beam and melt-level error signal used to control motor-driven pellet feeder, speeding up when level is low. System reduces demand upon operator's time.

B84-10194
MINIMIZING CONVECTION DURING CRYSTAL GROWTH
P. J. SHLICHTA
Feb. 1985
NPO-15811 **Vol. 8, No. 3, P. 419**
Buoyant convection during crystal growth from solution minimized in experiment cell using boundary-layer stabilizing configurants such as downward isothermal growth or upward growth into thermal gradient.

B84-10195
AUTOMATED TEXTURIZATION OF SILICON WAFERS
S. CHITRE (Photowatt International, Inc.), C. SNYDER (Photowatt International, Inc.), G. JONES (Photowatt International, Inc.), and P. MARLOWE (Photowatt International, Inc.)
Feb. 1985
NPO-15816 **Vol. 8, No. 3, P. 419**
Two-stage texturization of either single-crystal or polycrystalline wafers improves conversion efficiency of finished solar cells.

B84-10196
RECIPROCATING CRYSTALLIZER
R. B. LAL (Alabama A & M University) and M. AGGARWAL (Alabama A & M University)
Feb. 1985
MFS-25948 **Vol. 8, No. 3, P. 419**
Automatic crystallizer grows crystals from aqueous solutions. Crystals grown from aqueous solutions by slow cooling of growth solution along with forced convection to increase mass transfer.

B84-10197
IMPURITY EFFECTS ON DENDRITIC GROWTH
M. E. GLICKSMAN (Rensselaer Polytechnic Institute)
Feb. 1985
MFS-25672 **Vol. 8, No. 3, P. 419**
Measurements of effects of soluble impurity addition on dendritic growth rates and morphology allow testing of theoretical dendritic growth models.

B84-10198
ACOUSTIC SORTER FOR SMALL PARTS
T. G. WANG (CALTECH) and E. W. LEUNG (CALTECH)
Feb. 1985
NPO-15913 **Vol. 8, No. 3, P. 419**
Sorting system uses acoustic reasonance chamber, detects, and rejects anomalous parts on automated assembly line. System particularly suited to small nuts, bolts, pins, and assemblies which previously required expensive three dimensional television-monitoring systems to prevent misfeeds.

B84-10199
SQUARE-CUTTING GRINDER
G. B. DENNIS (Boeing Services International)
Feb. 1985
KSC-11257 **Vol. 8, No. 3, P. 419**
Attachment to grinder used to cut small pipe ends square and smooth, ready for welding. Attachment simple plate bracket fastened to air pencil grinder held against pipe flange to guide grinder.

B84-10200
HOLDER FOR STRAIGHTENING BENT TUBES
A. R. TURNER (Rockwell International Corp.) and E. D. POLZIEN (Rockwell International Corp.)
Feb. 1985
MFS-19705 **Vol. 8, No. 3, P. 420**

One-piece holder restrains bent metal tube against further bending during straightening operation. Holder consists of handle 16 in. (41 cm) long welded to short, strong tube that fits around tube to be straightened.

B84-10201
ANNULAR-TUBE REINFORCER
R. PESSIN (Rockwell International Corp.)
Feb. 1985
MFS-19738 **Vol. 8, No. 3, P. 420**

Cylindrical tool inserts support sleeves into annular space between coaxial tubes to provide local reinforcement. Tool particularly useful when space between outer ends of coaxial tubes is narrow, requiring thin sleeve.

B84-10379
OPTICAL-FIBER-WELDING MACHINE
W. C. GOSS (CALTECH), W. A. MANN (CALTECH), and R. GOLDSTEIN (CALTECH)
Apr. 1985
NPO-15004 **Vol. 8, No. 4, P. 554**

Technique yields joints with average transmissivity of 91.6 percent. Electric arc passed over butted fiber ends to melt them together. Maximum optical transmissivity of joint achieved with optimum choice of discharge current, translation speed, and axial compression of fibers. Practical welding machine enables delicate and tedious joining operation performed routinely.

B84-10380
ROOF POLISHING OF OPTICAL FIBERS
A. R. DHOLAKIA (RCA Corporation)
Apr. 1985
LAR-13070 **Vol. 8, No. 4, P. 554**

Bevealed tip gives optimum coupling efficiency. Abrasive tape used to grind tip of optical fiber. Grinding force depends on stiffness of optical fiber. 'Roof' shape on end of optical glass fiber increases efficiency which couples laser light. End surface angle of 65 degrees with perpendicular required for optimum coupling. Since fiber and tape are light in weight and compliant, ridge defect-free, and chipping on fiber edge totally eliminated.

B84-10381
FABRICATING UNDERWATER ELECTROACOUSTIC TRANSDUCERS
R. L. FERGUSON and R. W. LOVELADY
Apr. 1985
LAR-13007 **Vol. 8, No. 4, P. 555**

Use of retainer ring instead of adhesives simplifies assembly and disassembly. Underwater electroacoustical transducer assembly uses precast silicone rubber compressed between ceramic crystal and metal container. Removable retainer ring holds assembly in place. Method provides proper stress loading, speed and ease of assembly, and way of removing transducer without damaging crystal.

B84-10382
PRESTRESSED THERMAL-PROTECTION PANELS
T. J. DUNN
Apr. 1985
MSC-20254 **Vol. 8, No. 4, P. 556**

Panels held securely with minimum of mounting hardware. Each panel held in place by single screw that pulls it into flat shape from its original shallow-dish shape. Shape and prestressing make panel stiff: resists vibration and withstands large mechanical loads. Panel shape and mounting arrangement not limited to thermal-protection systems but also used on aircraft, building walls, or wherever large surfaces must be covered with stiff, flat sheets easily removed for maintenance.

B84-10383
SORTING TITANIUM WELDING RODS
W. D. ROSS JR. (Rockwell International Corp.) and R. L. BROWN (Rockwell International Corp.)
Apr. 1985
MSC-20588 **Vol. 8, No. 4, P. 557**

Three types of titanium welding wires identified by their resistance to current flow. Welding-wire tester quickly identifies unknown titaniumalloy wire by touching wire with test probe, and comparing meter response with standard response. Before touching wire, tip of test probe dipped into an electrolyte.

B84-10384
FLUORESCENT GAGE INDICATION
C. E. BARNS, B. L. GILBAUGH, B. GIN, W. L. HOLT, P. LESAK, R. MANCINI, and H. F. SPENCER
Apr. 1985
ARC-11397 **Vol. 8, No. 4, P. 558**

Transfer of dye shows quality of contact between two mating parts. Mating parts checked for fit by spreading fluorescent dye on one, making brief light contact with other, and looking (under UV light) for transferred dye. Dye offers greater visibility under ultraviolet illumination, allowing better indication of how precisely parts match and what areas interfere.

B84-10385
SOLAR-ARRAY SUBSTRATE FROM GLASS-REINFORCED CONCRETE
J. L. EIRLS (MB Associates)
Apr. 1985
NPO-15077 **Vol. 8, No. 4, P. 558**

Design elminiates glass superstrate and associated metal framing. Panel has two trapezoidal stiffening ribs for structural support. Strategic placement of ribs with embedded support tubes (standard PVC tubing) minimizes bending moments and resulting stresses produced by installation and windloads. Glass-reinforced concrete panel has smooth flat surface suitable for solar substrate and includes structural bracing for rigidity and design adaptable to mass production.

B84-10386
BONDING TECHNIQUE FOR STIFFENED-SKIN STRUCTURES
P. O. FRICKLAND (CALTECH), E. L. HEADRICK (CALTECH), and T. HASEGAWA (CALTECH)
Apr. 1985
NPO-15994 **Vol. 8, No. 4, P. 559**

Consistent bond thickness achieved even in large, complicated parts. Spring Clamp positions and holds parts assembled on tooling plate. Stiffener and backing bar held against adhesive layer by clamp. Spring action of clamp keeps steady force on pieces as they cure, insuring consistent bond thickness.

B84-10387
SOLDER BONDING FOR POWER TRANSISTORS
H. A. SNYTSHEUVEL (TRW, Inc.) and H. MANDEL (TRW, Inc.)
Apr. 1985
MSC-20570 **Vol. 8, No. 4, P. 559**

Indium solder boosts power rating and facilitates circuit changes. Efficient heat conduction from power transistor to heat sink provided by layer of indium solder. Low melting point of indium solder (141 degrees C) allows power transistor to be removed, if circuit must be reworked, without disturbing other components mounted with ordinary solder that melts at 181 degrees C. Solder allows devices operated at higher power levels than does conventional attachment by screws.

B84-10388
EDGE LABELS FOR MULTILAYER CIRCUIT BOARDS
P. J. ROSSI (Rockwell International Corp.)
Apr. 1985
MSC-20704 **Vol. 8, No. 4, P. 560**

Quick visual inspection identifies out-of-place layers. Small copper pads or other labels on layers present regular

pattern if multilayer circuit board properly assembled and irregular pattern if one or more layers in wrong place. New method faster, cheaper, and more reliable than earlier methods.

B84-10389
GLASS/EPOXY DOOR PANEL FOR AUTOMOBILES
J. L. BAUER JR. (CALTECH)
Apr. 1985
NPO-15057 **Vol. 8, No. 4, P. 561**

Lightweight panel cost-effective. Integrally-molded intrusion strap key feature of composite outer door panel. Strap replaces bulky and heavy steel instrusion beam of conventional door. Standard steel inner panel used for demonstration purposes. Door redesigned to exploit advantages of composite outer panel thinner. Outer panel for automobilie door, made of glass/epoxy composite material, lighter than conventional steel door panel, meets same strength requirements, and less expensive.

B84-10390
STRIPPING THE SHEATH FROM STRANDED CABLES
A. L. PRISK (CALTECH) and J. W. ROTTA (CALTECH)
Apr. 1985
NPO-15082 **Vol. 8, No. 4, P. 561**

Device similar to tubing cutter removes tough plastic cover. Insulation stripper is 3 in. (7.6 cm) long and 1.5 (3.8 cm) in diameter. Two rollers are small-diameter bearings. Cutter blade journaled for rotation between pair of similar bearings. Bearings either pin or ball types of suitable dimensions.

B84-10391
GRAVITATIONAL EFFECTS ON CRYSTAL GROWTH BY VAPOR TRANSPORT
J. A. ZOUTENDYK (CALTECH) and W. M. AKUTAGAWA (CALTECH)
Apr. 1985
NPO-15853 **Vol. 8, No. 4, P. 562**

Crystal-growth apparatus makes is possible to measure growth rates in three directions: up, down, and horizontal. Sealed in quartz ampoule, charge of source material vaporizes and condenses in crystalline state at colder end of tube. Apparatus allows effect of gravity on crystal growth determined quantitatively.

B84-10392
MAKING CUBIC SILICON CARBIDE SEMICONDUCTORS
J. POWELL, H. WILL, and S. NISHINO (Kyoto University)
Apr. 1985
LEW-14018 **Vol. 8, No. 4, P. 563**

Thin buffer layer of SiC minimizes effects of lattice mismatch. Approach consists of growing single-crystal layer of cubic SiC on single-crystal silicon (Si) wafer by chemical-vapor deposition (CVD). Process developed for production of large-area single-crystal wafers of cubic silicon carbide (SiC) for semiconductor devices; also used to make devices themselves. Applications include electronics for high temperature (up to 900 C) and electronics for very high frequencies.

B84-10393
GAS ATMOSPHERES IMPROVE SILICON-RIBBON QUALITY
F. V. WALD (Mobil Tyco Solar Energy Corp.) and J. P. KALEJS (Mobil Tyco Solar Energy Corp.)
Apr. 1985
NPO-15129 **Vol. 8, No. 4, P. 564**

Growing crystal surrounded by gas containing carbon or oxygen. Ribbon of solid silicon, edgewise, grows from pool of molten silicon in die. Gases flowing through orifice ensure longer diffusion length and less contaminiation by carbide particles in product.

B84-10394
CONTOURED ORIFICE FOR SILICON-RIBBON DIE
B. H. MACKINTOSH (Mobil Tyco Solar Energy Corp.)
Apr. 1985
NPO-15126 **Vol. 8, No. 4, P. 565**

Die configuration encourages purity and stable growth. Contour of die orifice changes near ribbon edges. As result, silicon ribbon has nearly constant width and little carbon contamination. Die part of furnace being developed to produce high-quality, low-cost material for solar cells.

B84-10395
TOP-COATING SILICON ONTO CERAMIC
J. D. HEAPS (Honeywell, Inc.), L. D. NELSON (Honeywell, Inc.), and J. D. ZOOK (Honeywell, Inc.)
Apr. 1985
NPO-15125 **Vol. 8, No. 4, P. 565**

Polycrystalline silicon for solar cells produced at low cost. Molten silicon poured from quartz trough onto moving carbon-coated ceramic substrate. Doctor blade spreads liquid silicon evenly over substrate. Molten material solidifies to form sheet of polycrystalline silicon having photovoltaic conversion efficiency greater than 10 percent. Method produces 100-um-thick silicon coatings at speed 0.15 centimeter per second.

B84-10396
BONDING HEAT-RESISTANT FABRIC TO TILE
J. W. HOLT (Rockwell International Corp.) and L. W. SMISER (Rockwell International Corp.)
Apr. 1985
MSC-20540 **Vol. 8, No. 4, P. 566**

Acid etching, densification, and silica cement ensure strong bond. Key step in preparation for bonding to glazed tile is etching quartz fabric and tile with acid. This increases adhesion of silica cement used to form bond. Procedures use high-temperature materials exclusively and therefore suitable for securing flexible seals and heat barriers around doors and viewing ports in furnaces and kilns.

B84-10397
EXPLOSIVE WELDING FOR REMOTE APPLICATIONS
L. J. BEMENT
Apr. 1985
LAR-13119 **Vol. 8, No. 4, P. 567**

Explosive seam welding produces up to 100-percent joint strength. Ribbon explosive activated by remote energy source produces metallurgically sound joint. Success of technique verified for joints between like metals and joints between two different metals. Applications include structural assembly in toxic atmospheres and in radioactive or otherwise hazardous environments.

B84-10398
WELDING MANY THIN METAL LAYERS
B. O. HARTWELL (Ametek), P. CARAS (Ametek), and P. H. HOBBES (Ametek)
Apr. 1985
MSC-20698 **Vol. 8, No. 4, P. 568**

Electron-beam welding yields reliable, leakproof joints. Welding bands (also called 'doublers') sandwiched between layers welded to increase final weld-section thickness. New technique ensures repeatable leakproof assemblies.

B84-10399
STRONG, LIGHWEIGHT CURVED PANELS
R. MOLHO (McDonnell Douglas Corp.) and H. L. BESTOR (McDonnell Douglas Corp.)
Apr. 1985
MSC-16278 **Vol. 8, No. 4, P. 569**

Sandwich construction gives panels structural efficiency. Large panels with compound curvatures are formed from a honeycomb core faced with sheets of graphite/epoxy cloth and tape. Developed for pod on Space Shuttle, construction readily adapted to curved skin panels on cars, trucks, and airplanes.

B84-10400
TAPE-MOUNTED THERMOCOUPLE

K. S. MACDAVID (CALTECH)
Apr. 1985
NPO-16291 **Vol. 8, No. 4, P. 569**
Thermocouple junctions soldered to copper-foil adhesives allow easy assembly.

B84-10401
CONNECTOR-ARRAY ATTACHMENT MATRIX
T. J. MALONEY (AIA Research Corp.)
Apr. 1985
NPO-15778 **Vol. 8, No. 4, P. 569**
Factory-assembled electrical/mechanical connectors on flexible sheets improve installation efficiency.

B84-10402
SNAPRING QUICK FASTENER
A. H. WILSON (CALTECH)
Apr. 1985
NPO-15724 **Vol. 8, No. 4, P. 569**
Snapring fastener allows quick attachment and detachment of solar panels. Springy structure bent to fit any recess, making solar-panel removal or repair extremely simple.

B84-10403
SPLICING EFFICIENTLY COUPLES OPTICAL FIBERS
G. F. LUTES (CALTECH)
Apr. 1985
NPO-16294 **Vol. 8, No. 4, P. 569**
Method of splicing single-mode optical fibers results in very low transmission losses through joined fiber ends. Coupling losses between joined optical-fiber ends only 0.1 dB. Method needs no special operator training.

B84-10404
AUTOMATED SOLAR-PANEL FABRICATOR
J. J. HAGERTY (MB Associates)
Apr. 1985
NPO-16205 **Vol. 8, No. 4, P. 569**
Automated computer-controlled system based on standard commercial industrial robot takes solar cells and other raw materials and assembles them into completed solar panels.

B84-10405
CLOSE-OUT PLUGS
T. ADAMS (Rockwell International Corp.)
Apr. 1985
MFS-19370 **Vol. 8, No. 4, P. 570**
Externally-applied circular plug seals holes in walls up to 0.44 (12 mm) in diameter.

B84-10406
ACOUSTIC LEVITATION SYSTEM
P. M. GAMMELL (CALTECH), T. G. WANG (CALTECH), A. CROONQUIST (CALTECH), and M. C. LEE (CALTECH)
Apr. 1985
NPO-16146 **Vol. 8, No. 4, P. 570**
Dense materials, such as steel balls, continuously levitated with energy provided by efficient high-powered siren in combination with shaped reflector. Reflector system, consisting of curved top reflector and flat lower reflector, eliminates instability in spatial positioning of sample.

B84-10407
ACOUSTIC POSITION SERVOSYSTEM
E. W. LEUNG (CALTECH), C. P. LEE (CALTECH), and T. G. WANG (CALTECH)
Apr. 1985
NPO-15936 **Vol. 8, No. 4, P. 570**
Servosystem automatically centers levitated objects within given volume.

B84-10408
HEAT-SHIELD GAP FILLER
D. B. LEISER, D. A. STEWART, M. SMITH, C. ESTRELLA, and H. E. GOLDSTEIN
Apr. 1985
ARC-11310 **Vol. 8, No. 4, P. 570**
Ceramic cloth strips provide flexible, easily replaceable insulating filler. Filler prevents hot gas from flowing between heat-shield tiles while allowing space for thermal expansion and contraction. Strips easily replaced when necessary.

09 MATHEMATICS AND INFORMATION SCIENCES

B84-10202
CALCULATING CLOSED-LOOP SENSITIVITY TO PARAMETER VARIATIONS
D. B. SCHAECHTER (CALTECH)
Feb. 1985
NPO-15941 **Vol. 8, No. 3, P. 423**
Performance sensitivity calculated by back substitution. Original Lyapunov equation differentiated two times with respect to parameter p. Each differential turns out to yield Lyapunov equation for first and second derivatives with respective to parameter p of steady-state covariance of state variables. Derivatives desired closed-loop performance sensitivities.

B84-10203
TECHNI-KITS AND TECHNI-KIT BUILDING SYSTEMS
E. D. CALLENDER (CALTECH), C. HARTSOUGH (CALTECH), R. V. MORRIS (CALTECH), and Y. YAMAMOTO (CALTECH)
Feb. 1985
NPO-15956 **Vol. 8, No. 3, P. 423**
Techni-kits consists of theories, methods, standards and computer based tools that assist in design of information-intensive systems. Techni-kit 'building system' is techni-kit that builds techni-kits.

B84-10204
FAST TWO-DIMENSIONAL DIGITAL-FILTER HARDWARE
T. R. EDWARDS
Feb. 1985
MFS-25876 **Vol. 8, No. 3, P. 424**
Report describes principles of hardware implementation of two-dimensional 5 by 5 convolute-integer low pass filter. Filter processes image data points fast enough for real-time use in image analysis and enhancement.

B84-10205
DESIGN PRIMER FOR REED-SOLOMON ENCODERS
M. PERLMAN (CALTECH) and J. J. LEE (CALTECH)
Feb. 1985 See Also NASA CR-16974 (N83-17141/NSP)
NPO-15568 **Vol. 8, No. 3, P. 424**
Design and operation of Reed-Solomon (RS) encoders discussed in document prepared as instruction manual for computer designers and others in dataprocessing field. Conventional and Berlekamp architectures compared. Engineers who equip computer memory chips with burst-error and dropout detection and correction find report especially useful.

B84-10206
RESEARCH-CONCEPT EVALUATION
M. J. WHITE (ARINC Research Corp.) and W. KOLB (ARINC Research Corp.)
Feb. 1985
LAR-13143 **Vol. 8, No. 3, P. 425**
Concepts ranked according to potential benefit/cost ratios. ARINC Researh Concept Evaluation Methodology (ARCEM) program provides powerful tool for organization and planning of research activities indicating which con-

cepts provide greatest benefit for investment and determines number of concepts implemented to justify expenditures for development of generic technologies.

B84-10207
RELATIONAL INFORMATION MANAGEMENT DATABASE SYSTEM
O. O. STORAASLI, W. J. ERICKSON (Boeing Commercial Airplane Co.), F. P. GRAY (Boeing Commercial Airplane Co.), D. L. COMFORT (Boeing Commercial Airplane Co.), S. O. WAHLSTROM (Boeing Commercial Airplane Co.), and G. VON LIMBACH (Boeing Computer Services Co.)
Feb. 1985
LAR-12943; LAR-12944; LAR-12945 Vol. 8, No. 3, P. 425
DBMS with several features particularly useful to scientists and engineers. RIM5 interfaced with any application program written in language capable of Calling FORTRAN routines. Applications include data management for Space Shuttle Columbia tiles, aircraft flight tests, high-pressure piping, atmospheric chemistry, census, university registration, CAD/CAM Geometry, and civil-engineering dam construction.

B84-10208
SDDL: SOFTWARE DESIGN DOCUMENTATION LANGUAGE
H. KLEINE (CALTECH), D. E. CALLENDER (CALTECH), and T. M. ZEPKO (CALTECH)
Feb. 1985
NPO-16201; NPO-16202 Vol. 8, No. 3, P. 426
Promotes effective communications between software designer and user. SDDL successful on tasks ranging from small, one-person informal projects to large projects of hundreds of formally published pages of design.

B84-10209
SOFTWARE COST-ESTIMATION MODEL
R. C. TAUSWORTHE (CALTECH)
Feb. 1985
NPO-15862 Vol. 8, No. 3, P. 426
Software Cost Estimation Model SOFTCOST provides automated resource and schedule model for software development. Combines several cost models found in open literature into one comprehensive set of algorithms. Compensates for nearly fifty implementation factors relative to size of task, inherited baseline, organizational and system environment and difficulty of task.

B84-10210
SOFTWARE DESIGN ANALYZER SYSTEM
R. C. TAUSWORTHE (CALTECH)
Feb. 1985
NPO-16234 Vol. 8, No. 3, P. 426
CRISP80 software design analyzer system a set of programs that supports top-down, hierarchic, modular structured design, and programing methodologies. CRISP80 allows for expression of design as picture of program.

B84-10211
INTEGRATED PROCUREMENT MANAGEMENT SYSTEM, VERSION II
L. J. COLLIER (Computer Science Corp.)
Feb. 1985
MSC-20278 Vol. 8, No. 3, P. 427
Integrated Procurement Management System, Version II (IPMS II) is online/ batch system for collecting developing, managing and disseminating procurementrelated data at NASA Johnson Space Center. Portions of IPMS II adaptable to other procurement situations.

B84-10212
LANGUAGE FOR ALLOCATION AND NETWORK SCHEDULING
J. K. WILLOUGHBY (Science Applications, Inc.)
Feb. 1985
MSC-20633 Vol. 8, No. 3, P. 427
Programing Language for Allocation and Network Scheduling, Plans, handles many scheduling requirements of Space Shuttle program. Also generalized, high-level tree manipulation language.

B84-10213
A VISUALLY ORIENTED TEXT EDITOR
J. E. GOMEZ (CALTECH)
Feb. 1985
NPO-15088 Vol. 8, No. 3, P. 427
HERMAN employs Evans & Sutherland Picture System 2 to provide screenoriented editing capability for DEC PDP-11 series computer. Text altered by visual indication of characters changed. Group of HERMAN commands provides for higher level operations. HERMAN provides special features for editing FORTRAN source programs.

B84-10214
STRUCTURED FORTRAN PREPROCESSOR
J. A. FLYNN (CALTECH), C. L. LAWSON (CALTECH), W. VAN SNYDER (CALTECH), and H. N. TSITSIVAS (CALTECH)
Feb. 1985
NPO-15726 Vol. 8, No. 3, P. 428
SFTRAN3 supports structured programing in FORTRAN environment. Language intended particularly to support two aspects of structured programing -nestable single-entry control structures and modularization and top-down organization of code. Code designed and written using these SFTRAN3 facilities have fewer initial errors, easier to understand and less expensive to maintain and modify.

B84-10215
NASTRAN NASTPLT PLOTTING POST PROCESSOR
R. STRANG (Computer Sciences Corp.)
Feb. 1985
GSC-12833 Vol. 8, No. 3, P. 428
NASTRAN NASTPLT Plotting Post Processor reads NASTRAN-generated NASTPLT plot files, checks file contents for validity and translates NASTPLT plot commands into appropriate calls to plotting routines for either CALCOMP Tektronix PLOT10, or Versatec plotting systems.

B84-10216
ALGORITHM SOLVES CONSTRAINED AND UNCONSTRAINED OPTIMIZATION PROBLEMS
M. A. DENSON (McDonnell Douglas Corp.)
Feb. 1985
MSC-20683 Vol. 8, No. 3, P. 428
Is quasi-Newton iteration utilizing Broyden/Fletcher/Goldfarb/Shanno update on inverse Hessian matrix. Capable of solving constrained optimization unconstrained optimization and constraints only problems with one to five independent variables from one to five constraint functions and one dependent function optimized.

B84-10217
HANDLING SOFTWARE REQUESTS FOR COMMANDS
W. KING JR. (IBM Corp.)
Feb. 1985
KSC-11226 Vol. 8, No. 3, P. 429
Software component created expressly to provide interface between dedicated command buffer and components requesting command issuance. Component resolves problems that arise when software processes command requests from other subsystems and several requests received at approximately same time.

B84-10218
PRIORITY-BASED DISPATCHING ALGORITHM
G. OUZTS (IBM Corp.)
Feb. 1985
KSC-11277 Vol. 8, No. 3, P. 429
Tasks assigned to different queues based on priority. Proposed algorithm controls execution of transient tasks of different priorities in real-time computation.

B84-10219
MORE EFFICIENT STRUCTURAL DESIGN BY OPTIMALITY CRITERIA
R. LEVY (CALTECH)
Feb. 1985
NPO-15832; NPO-15993 **Vol. 8, No. 3, P. 429**
Computer algorithm aids in selection of active constraints on structural design via optimality-criterion method-highly useful way of ensuring lightweight, low-cost structures.

B84-10220
ADDING STALE-DATA FLAG TO AND ERROR-CORRECTING CODE
N. BELL SR. (IBM Corp.), J. BURKAVAGE (IBM Corp.), and J. WICKS (IBM Corp.)
Feb. 1985
KSC-11134 **Vol. 8, No. 3, P. 429**
A suitable constant 'exclusive-Ored' with ECC to flag data without impairing detection of correctable errors.

B84-10221
ROOT-LOCUS ALGORITHMS
E. R. WECHSLER (CALTECH)
Feb. 1985
NPO-16154 **Vol. 8, No. 3, P. 430**
Two algorithms for use on programable pocket calculators allow plotting of individual points on root-locus diagram with or without time delay.

B84-10222
ALGORITHMS FOR FINITE-ELEMENT EQUATIONS
M. A. SALAMA (CALTECH), R. MELOSH (Duke University), and S. UTKU (Duke University)
Feb. 1985
NPO-16029 **Vol. 8, No. 3, P. 430**
Five direct and five iterative algorithms for finite element equations in linear equilibrium problems investigated for number of parallel computer architectures and their basic computation methods compared.

B84-10223
SOFTWARE-IMPLEMENTATION PLAN
G. JACOBSON (CALTECH) and A. SPINAK (CALTECH)
Feb. 1985
NPO-16123 **Vol. 8, No. 3, P. 430**
Top-down implementation plan provides a methodology for solving problems in or aiding software engineering design.

B84-10224
TEST SEQUENCES FOR REED-SOLOMON ENCODERS
J. J. LEE (CALTECH)
Feb. 1985
NPO-15542 **Vol. 8, No. 3, P. 430**
Theory of Reed-Solomon codes yields sequences of input test symbols. Two specific sequences worked out for codes of 8 bits per symbol with 223 information symbols and 32 parity check symbols per code words. Test patterns also used for decoders.

B84-10409
FLIGHT-STABILITY EXTREMES CALCULATED FROM THE UNCERTAINTY ELLIPSE
D. F. DOMINIK (Rockwell International Corp.)
Apr. 1985
MSC-20308 **Vol. 8, No. 4, P. 573**
Tangents and normals to ellipse derived for situations with two correlated aerodynamic force or moment variables having normally (Gaussian) distributed uncertainty. Although transformations and vector calculations tedious when done by hand, equations in closed form and give rapid results when performed by computers or programable desk calculators. Probability extremes of ratios and magnitude obtained directly, without repeated table lookup or other complication.

B84-10410
PREDICTING THE RELIABILITY OF SOLAR-CELL INTERCONNECTIONS
G. R. MON (CALTECH), D. M. MOORE (CALTECH), and R. G. ROSS JR. (CALTECH)
Apr. 1985
NPO-15976 **Vol. 8, No. 4, P. 574**
The reduction of life expectancy by thermal cycling calculated during design. Connections between solar cells critical parts of solarcell arrays generating electric power. Reliability affects life expectancy of modules, panels, and arrays. Used to predict stress-cycle lifetimes of such structures as arches, walkways, cylindrical ribbing of aircraft fuselages and submarine hulls, and pipeline expansion loops. Testing costs reduced by about 90 percent.

B84-10411
PREDICTING SEVERE DUSTSTORMS
P. M. WOICHESHYN (CALTECH)
Apr. 1985
NPO-14999 **Vol.8, No. 4, P. 575**
Combined human/machine forecasting technique shows promise. Severe duststorms in Great Plains forecast with fair reliability. Forecasts derived from combination of human expertise and variety of meteorological information sources, including all current and recent weather observations, standard National Meteorological Center (NMC) computer analyses for surface and upper air, and NMC 12-, 24-, 36-, and 48-hour prognostication charts generated by Limited Fine Mesh computer model.

B84-10412
COST CONSIDERATIONS IN NONLINEAR FINITE-ELEMENT COMPUTING
S. UTKU (Duke University), R. J. MELOSH (Duke University), M. ISLAM (Duke University), and M. SALAMA (CALTECH)
Apr. 1985
NPO-16237 **Vol. 8, No. 4, P. 576**
Conference paper discusses computational requirements for finiteelement analysis using quasi-linear approach to nonlinear problems. Paper evaluates computational efficiency of different computer architecturtural types in terms of relative cost and computing time.

B84-10413
SOURCE PRE-PROCESSOR OR INTERFACE-SPECIFICATION LANGUAGE
W. J. LUEBKERT (Telos Computing, Inc.)
Apr. 1985
NPO-15814 **Vol. 8, No. 4, P. 576**
A user's guide available for source program preprocessor (SPP) method for producing descriptions of data structures or records. SPP enhances usefulness of Program Design Language (PDL) - software-design tool decreases debugging time and improves quality of source programs.

B84-10414
LIBRARY INFORMATION-PROCESSING SYSTEM
Innovator Not Given (Informatics General Corp.) Apr. 1985
GSC-12861 **Vol. 8, No. 4, P. 576**
System works with Library of Congress MARC II format. System composed of subsystems that provide wide range of library information processing capabilities. Format is American National standards Institute (ANSI) format for machine-readable bibliographic data. Adaptable to any medium-to-large library.

B84-10415
ORBITAL AND GEODETIC ERROR ANALYSIS
T. FELSENTREGER, P. MARESCA (Business Technological Systems), and R. ESTES (Busniess Technological Systems)
Apr. 1985
GSC-12768 **Vol. 8, No. 4, P. 577**
Results that previously required several runs determined in more computer-efficient manner. Multiple runs performed

only once with GEODYN and stored on tape. ERODYN then performs matrix partitioning and linear algebra required for each individual error-analysis run.

B84-10416
MANAGING SOFTWARE DESIGN AND DESIGN CHANGES
R. E. LOESH (CALTECH)
Apr. 1985
NPO-15331 **Vol. 8, No. 4, P. 577**

Microprocessor-based system for document production work scheduling, and change control and management information aids in design, development, and control of software. Main components Z80 microprocessor, floppydisk and hard-disk drives, and a character printer. System linked to large computer. Major software components are control program monitor (CP/M), text-editing and wordprocessing system, workbreakdown-schedule processor, and database management tool.

B84-10417
ERROR CORRECTION FOR TANDEM DATA-TRANSMISSION PATHS
E. C. POSNER (CALTECH) and A. L. RUBIN (CALTECH)
Apr. 1985
NPO-16125 **Vol. 8, No. 4, P. 578**

Mathematical analysis for digital data transmission calculates optimum number of binary error-correcting repeaters to install in given number of wideband channel links. Asymptotic results compared to computed numerical results.

B84-10418
SIMPLIFIED CONVOLUTION CODES
T. K. TRUONG (CALTECH) and I. S. REED (CALTECH)
Apr. 1985
NPO-16251 **Vol. 8, No. 4, P. 578**

Simple recursive algorithm efficiently calculates minimum-weight error vectors using Diophantine equations. Recursive algorithm uses general solution of polynomial linear Diophantine equation to determine minimum-weight error polynomial vector in equation in polynomial space.

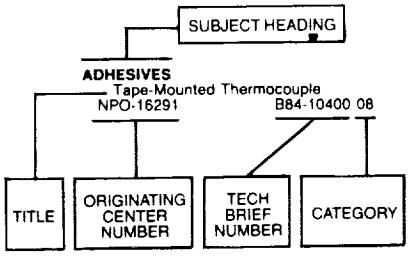
B84-10419
PREDICTIVE SMOOTHING-CONVOLUTION ALGORITHM
J. C. ALVAREZ (Ford Aerospace Communications Corp.)
Apr. 1985
MSC-20604 **Vol. 8, No. 4, P. 578**

Signal estimate continually updated with or without phase correction. Technique useful where signal varies slowly with respect to sampling rate.

B84-10420
PARALLEL VLSI ARCHITECTURE
T. K. TRUONG (CALTECH), I. REED (University of Southern California), C. YEH (University of Southern California), and H. SHAO (University of California)
Apr. 1985
NPO-16124 **Vol. 8, No. 4, P. 578**

Fermat number transformation convolutes two digital data sequences. Very-large-scale integration (VLSI) applications, such as image and radar signal processing, X-ray reconstruction, and spectrum shaping, linear convolution of two digital data sequences of arbitrary lenghts accomplished using Fermat number transform (ENT).

Typical Subject Index Listing



The title of each Tech Brief is listed under several selected subject headings to provide the user with a variety of approaches in his search for specific information. The Tech Brief number, e.g., B84-10400, is located under and to the right of the title and is followed by a two-digit number, e.g., 08, which designates the subject category in which the entire entry can be found.

A

ABRASION
Cleaning The Walls of A Silane Reactor
NPO-15851 B84-10318 04
ACCIDENT PREVENTION
Automatic Coal-Mining System
NPO-15861 B84-10151 07
ACOUSTIC EMISSION
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06
ACOUSTIC LEVITATION
Containerless Manufacture of Glass Optical Fibers
MFS-25905 B84-10075 04
Matching Impedances and Modes in Acoustic Levitation
NPO-16022 B84-10184 08
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
Applying Uniform Polymer Coatings To Microspheres
NPO-16075 B84-10308 04
Acoustic Levitation System
NPO-16146 B84-10406 08
Acoustic Position Servosystem
NPO-15936 B84-10407 08
ACOUSTIC MEASUREMENT
Acoustic Sorter for Small Parts
NPO-15913 B84-10198 08
Interferometer for Measuring Acoustic Signals
LAR-13030 B84-10281 03
ACTUATORS
Faster Response for Memory-Metal Actuators
NPO-16120 B84-10148 07
Memory-Metal Stepping Motor
NPO-15482 B84-10167 07
Linear Boom Actuator
NPO-16099 B84-10374 07
ADAPTIVE FILTERS
Fast Two-Dimensional Digital-Filter Hardware
MFS-25876 B84-10204 09
ADHESION TESTS
Insulation Debond Detection
MFS-25862 B84-10324 06
ADHESIVE BONDING
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
Bonding Heat-Resistant Fabric to Tile
MSC-20540 B84-10396 08
ADHESIVES
Tape-Mounted Thermocouple
NPO-16291 B84-10400 08
AERODYNAMIC CHARACTERISTICS
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07
AERODYNAMIC DRAG
Aerodynamic Design of Road Vehicles
NPO-15474 B84-10154 07
AERODYNAMIC FORCES
Flight-Stability Extremes Calculated From the Uncertainty Ellipse
MSC-20308 B84-10409 09
AERODYNAMIC INTERFERENCE
The Effect of Wind on the Aerodynamic Resistance of Highway Vehicles
NPO-14771 B84-10152 07
AERODYNAMICS
Aerodynamic Analysis of Low-Speed Wing-Flap Systems
LAR-13116 B84-10124 06
AIR TRAFFIC CONTROL
Fuel-Conservative Descents Using A Programable Calcultor
LAR-13138 B84-10333 06
AIRCRAFT DESIGN
Propeller Design Program
LAR-13141 B84-10371 07
AIRCRAFT HAZARDS
Bolt Inserts for Lightning Protection
MFS-25918 B84-10156 07
AIRCRAFT INSTRUMENTS
Automatic Monitoring of Switching Power Supplies
MFS-25968 B84-10028 02
AIRCRAFT MODELS
Prewhirl Jet Model
MFS-19826 B84-10136 06
AIRCRAFT PERFORMANCE
Aerodynamic Analysis of Low-Speed Wing-Flap Systems
LAR-13116 B84-10124 06
AIRCRAFT STRUCTURES
Lightning Protection for Composite Aircraft Structures
LAR-12879 B84-10120 06
AIRFRAMES
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06
ALGORITHMS
Multiple-User Adaptive-Array Communication System
NPO-15765 B84-10037 02
Reed-Solomon Encoder
NPO-16074 B84-10048 02
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09
ALIGNMENT
Machining of Silicon-Ribbon-Forming Dies
NPO-15127 B84-10173 08
ALUMINUM ALLOYS
Solution Potentials Indicate Aluminum-Alloy Tempers
MFS-25846 B84-10081 04
AMPLIFIERS
Improved RF Isolation Amplifier
NPO-16026 B84-10011 01
ANALOG TO DIGITAL CONVERTERS
Fast Dual Analog-to-Digital Converter
NPO-15006 B84-10026 02
ANECHOIC CHAMBERS
Acoustic Sorter for Small Parts
NPO-15913 B84-10198 08
ANNEALING
Activated Internal Gettering
NPO-15530 B84-10316 04
ANTENNA DESIGN
Antenna Subreflector Fed by a Line Source
MSC-20626 B84-10237 01
Ellipsoidal Balloon Antenna
NPO-15931 B84-10238 01
Efficient Reflector Antenna
NPO-16262 B84-10239 01
Theoretical Investigation Of Dielectric Horn Antennas
GSC-12876 B84-10245 01
ANTENNA RADIATION PATTERNS
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01
ANTENNAS
Circularly-Polarized Microstrip Antenna
NPO-15875 B84-10009 01
AQUATIC PLANTS
Aquatic Plants Aid Sewage Filter
MFS-25808 B84-10095 05
ARC WELDING
Two-Pulse Stitch Welding
MFS-25716 B84-10188 08

ARCHITECTURE
Parallel VLSI Architecture
NPO-16124 B84-10420 09
ARCHITECTURE (COMPUTERS)
Design Primer for Reed-Solomon Encoders
NPO-15568 B84-10205 09
ARITHMETIC AND LOGIC UNITS
Digital Ratiometer
NPO-15396 B84-10271 02
ASSEMBLING
Connector-Array Attachment Matrix
NPO-15778 B84-10401 08
Automated Solar-Panel Fabricator
NPO-16205 B84-10404 08
ASSOCIATIVE PROCESSING (COMPUTERS)
Handling Software Requests for Commands
KSC-11226 B84-10217 09
ATMOSPHERICS
Monitoring of Reactive Atmospheric Species
NPO-15981 B84-10063 03
AUTOMATED RADAR TERMINAL SYSTEM
Synchronized Radar-Target Simulator
MSC-20240 B84-10263 02
AUTOMATIC FREQUENCY CONTROL
Temperature Compensation for a Frequency-Modulated Oscillator
MSC-20556 B84-10249 01
AUTOMATIC TEST EQUIPMENT
Capacitor-Test System
NPO-16485 B84-10038 02

B

BAKING
Vacuum Baking To Remove Volatile Materials
NPO-15648 B84-10080 04
BALL BEARINGS
Eddy-Current Inspection of Ball Bearings
MFS-25833 B84-10104 06
BALLOONS
Ellipsoidal Balloon Antenna
NPO-15931 B84-10238 01
BALLS
A Positive-Shutoff Fuel Valve
MFS-19779 B84-10145 06
BANDWIDTH
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02
BARRIER LAYERS
Reusable Thermal Barrier for Insulation Gaps
MSC-20519 B84-10329 06
BATCH PROCESSING
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
BEAMS (SUPPORTS)
Beam-Cap-Forming Machine
MFS-27007 B84-10183 08
BELLOWS
Sealing Mechanical Cryogenic Coolers
NPO-15139 B84-10149 07
BENDING
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08
BERNOULLI THEOREM
Tapered Ring Seal
LEW-10455 B84-10361 07
BLADES (CUTTERS)
Automatically Dressing Blades in Silicon-Wafer Cutting
NPO-15745 B84-10174 08
BLOOD VESSELS
Probe Follower for Moving Blood Vessels
NPO-15898 B84-10321 05
BLUFF BODIES
Aerodynamic Design of Road Vehicles
NPO-15474 B84-10154 07
BOILERS
Microphone Detects Boiler-Tube Leaks
NPO-16027 B84-10348 06
BOLTS
Measuring Side Loads On Bolts
NPO-15705 B84-10137 06
Bolt Inserts for Lightning Protection
MFS-25918 B84-10156 07
Acousto-optic Extensometer for Bolts
MFS-19914 B84-10336 06
BONDING
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
Solder Bonding for Power Transistors
MSC-20570 B84-10387 08
BOOMS (EQUIPMENT)
Linear Boom Actuator
NPO-16099 B84-10374 07
BRAKES (FOR ARRESTING MOTION)
Magnetic Despinning System
MFS-25966 B84-10166 07
Safety Pedal for Foot-Operated Machinery
MSC-20535 B84-10356 07
BUBBLES
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04
BY-PRODUCTS
Inhibiting Wet Oxidation of Ammonia
ARC-11407 B84-10307 04

C

CABLES (ROPES)
Stripping the Sheath From Stranded Cables
NPO-15082 B84-10390 08
CALIBRATING
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06
In-Place Calibration of Instrumentation Microphones
ARC-11463 B84-10349 06
CAMERAS
High-Resolution vice Camera
NPO-15086 B84-10275 02
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
CAPACITORS
Capacitor-Test System
NPO-16485 B84-10038 02
High-Frequency, High-Power Capacitor
LEW-14034 B84-10225 01
CARGO
Holding Cargo in Place With Foam
MSC-20723 B84-10367 07
CARRIAGES
Thermal Compensator for Paraboloidal Reflector
NPO-16145 B84-10301 03
CATALOGS (PUBLICATIONS)
Library Information-Processing System
GSC-12861 B84-10414 09
CATHODES
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
CAVITY RESONATORS
Tuning Concept for Resonant Cavities
NPO-15890 B84-10004 01
CELL ANODES
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
CERAMICS
Testing Ceramics for Diesel Engines
NPO-15824 B84-10078 04
A Ceramic Heat Exchanger for Solar Receivers
NPO-15771 B84-10296 03
Stabilized Aluminum Titanate
NPO-16227 B84-10319 04
CHANNELS (DATA TRANSMISSION)
Priority Queuing On A Parallel Data Bus
NPO-15005 B84-10261 02
CHARGE COUPLED DEVICES
Isolation Mounting for Charge-Coupled Devices
NPO-15551 B84-10005 01
Quicker Selection of CCD Images
NPO-15345 B84-10274 02
High-Resolution vice Camera
NPO-15086 B84-10275 02
CHARGE EXCHANGE
Measuring Air-Ionizer Output
NPO-16058 B84-10242 01
CHEMICAL REACTORS
Making Pure Fine-Grained Inorganic Powder
NPO-16398 B84-10086 04
CHEMICAL TESTS
Integrated Exhaust-Gas-Analysis System
LEW-14062 B84-10337 06
CHLORINATION
Preparing InSb Substrates
NPO-16127 B84-10317 04
CHROMATOGRAPHY
Dialysis Extraction for Chromatography
NPO-15691 B84-10100 05
CIRCUIT BOARDS
Edge Labels for Multilayer Circuit Boards
MSC-20704 B84-10388 08
CIRCUIT PROTECTION
Hall-Effect Ground-Fault Interruptor
NPO-15915 B84-10255 01
CLAMPS
Clamp Secures Material to Cylinder Base
MFS-19479 B84-10158 07
Magnetic Chuck for Precise Grinding
MFS-19764 B84-10191 08

Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
CLASSIFIERS
Acoustic Sorter for Small Parts
NPO-15913 B84-10198 08
Differential-Coil Eddy-Current Material Sorter
MFS-19872 B84-10231 01
CLEANING
Cleaning The Walls of A Silane Reactor
NPO-15851 B84-10318 04
CLEARANCES
Measuring Clearance Indirectly
MFS-19875 B84-10355 06
CLOSED CIRCUIT TELEVISION
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02
CLOSED ECOLOGICAL SYSTEMS
Experimental Ecosystems Sealed in Glass
NPO-15712 B84-10097 05
CLOSURES
Close-Out Plugs
MFS-19370 B84-10405 08
CLOUD CHAMBERS
Uniform-Temperature Walls for Cloud Chambers
MFS-25931 B84-10110 06
CLUTCHES
Memory-Metal Stepping Motor
NPO-15482 B84-10167 07
Power Train for Hybrid Electric Vehicle
NPO-15742 B84-10377 07
COAL
Automatic Coal-Mining System
NPO-15861 B84-10151 07
Pillar-Trimming System
NPO-15848 B84-10160 07
COAL DERIVED GASES
Solar-Heated Gasifier
NPO-15071 B84-10293 03
COAL GASIFICATION
Pressure-Letdown Plates for Coal Gasifiers
NPO-15965 B84-10077 04
Integrated Fuel Cell/Coal Gasifier
NPO-16062 B84-10314 04
COAL UTILIZATION
Desulfurization of Coal in Fluidized Beds
NPO-15924 B84-10303 04
COATING
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08
COATINGS
Streaming-Potential Studies
MFS-25657 B84-10092 04
CODERS
Reed-Solomon Encoder
NPO-16074 B84-10048 02
Design Primer for Reed-Solomon Encoders
NPO-15568 B84-10205 09
Test Sequences for Reed-Solomon Encoders
NPO-15542 B84-10224 09
CODING
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
COERCIVITY
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04
COLUMBIA (ORBITER)
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
COLUMNS (SUPPORTS)
Structural Turnbuckle Bears Compressive or Tensile Loads
MFS-25939 B84-10106 06
Coilable-Column Development
MFS-27032 B84-10142 06
COMBUSTION CHAMBERS
Turbulent Recirculating Flows in Isothermal Combustor Geometries
LEW-13894 B84-10128 06
Computation of Three-Dimensional Combustor Performance
LEW-13930 B84-10129 06
COMMAND AND CONTROL
Handling Software Requests for Commands
KSC-11226 B84-10217 09
Priority-Based Dispatching Algorithm
KSC-11277 B84-10218 09
COMMUNICATION NETWORKS
Priority Queuing On A Parallel Data Bus
NPO-15005 B84-10261 02
Short-Range Digital Optical Links
NPO-15999 B84-10269 02
COMPENSATORS
Thermal Compensator for Paraboloidal Reflector
NPO-16145 B84-10301 03
COMPOSITE STRUCTURES
Beam-Cap-Forming Machine
MFS-27007 B84-10183 08
Glass/Epoxy Door Panel for Automobiles
NPO-15057 B84-10389 08
COMPRESSED AIR
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
COMPRESSIBLE FLOW
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06
COMPRESSING
Vented Compression Molding of Granule-Filled Resins
MFS-25975 B84-10181 08
COMPRESSIVE STRENGTH
Structural Turnbuckle Bears Compressive or Tensile Loads
MFS-25939 B84-10106 06
COMPUTATION
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
COMPUTER AIDED DESIGN
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02
COMPUTER DESIGN
Computerized Interactive Harness Engineering
NPO-16272 B84-10014 01
Design Primer for Reed-Solomon Encoders
NPO-15568 B84-10205 09
COMPUTER GRAPHICS
Standard Fastener Library
MSC-20645 B84-10153 07
COMPUTER PROGRAMMING
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
COMPUTER PROGRAMS
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
Handling Software Requests for Commands
KSC-11226 B84-10217 09
Source Pre-Processor or Interface-Specification Language
NPO-15814 B84-10413 09
Managing Software Design and Design Changes
NPO-15331 B84-10416 09
COMPUTER SYSTEMS PERFORMANCE
Monitoring Performance of Complex Systems
KSC-11273 B84-10031 02
COMPUTER SYSTEMS PROGRAMS
Software for PROM Programing
MSC-20641 B84-10013 01
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
Software Design Analyzer System
NPO-16234 B84-10210 09
COMPUTERIZED SIMULATION
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08
Software Cost-Estimation Model
NPO-15862 B84-10209 09
CONCENTRATION (COMPOSITION)
Equation for Electrolyte Viscosity
NPO-15096 B84-10076 04
CONCRETE STRUCTURES
Solar-Array Substrate From Glass-Reinforced Concrete
NPO-15077 B84-10385 08
CONDUCTIVE HEAT TRANSFER
Flexible Heat Pipe
GSC-12864 B84-10109 06
CONDUCTIVITY METERS
Differential-Coil Eddy-Current Material Sorter
MFS-19872 B84-10231 01
CONNECTORS
Connector-Array Attachment Matrix
NPO-15778 B84-10401 08
CONSTRUCTION INDUSTRY
Automated Solar-Panel Fabricator
NPO-16205 B84-10404 08
CONTACT RESISTANCE
Measuring The Contact Resistances Of Photovoltaic Cells
NPO-16168 B84-10240 01
CONTAINERLESS MELTS
Containerless Manufacture of Glass Optical Fibers
MFS-25905 B84-10075 04
Pure Glasses From Multicomponent Gels
NPO-16160 B84-10079 04
CONTAINERS
Holding Cargo in Place With Foam
MSC-20723 B84-10367 07
CONTAMINATION
Laser Pollutant-Measuring Systems
NPO-16101 B84-10285 03
CONTROL DATA (COMPUTERS)
Programable Multicrate Controller
MFS-25533 B84-10042 02
CONTROL EQUIPMENT
Fiber-Optic Equipment for Power-System Control
NPO-15968 B84-10266 02

Deployable Geodesic Truss
LAR-13113 B84-10351 06
CONTROL SIMULATION
Transfer-Function Simulator
NPO-15696 B84-10046 02
CONTROL THEORY
Root-Locus Algorithms
NPO-16154 B84-10221 09
CONTROLLED ATMOSPHERES
Gas Atmospheres Improve Silicon-Ribbon Quality
NPO-15129 B84-10393 08
CONTROLLERS
Programable Multicrate Controller
MFS-25533 B84-10042 02
CONVECTION
Minimizing Convection During Crystal Growth
NPO-15811 B84-10194 08
CONVERGENCE
Algorithm Solves Constrained and Unconstrained Optimization Problems
MSC-20683 B84-10216 09
COOLING
Preventing Fires in Cryogenic Oxidizer Lines
MFS-19830 B84-10115 06
COPOLYMERS
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
CORRELATION
Estimates of Small Signal/Noise Ratios
NPO-15653 B84-10257 02
CORROSION TESTS
Solution Potentials Indicate Aluminum-Alloy Tempers
MFS-25846 B84-10081 04
COST ANALYSIS
Software Cost-Estimation Model
NPO-15862 B84-10209 09
COST EFFECTIVENESS
Research-Concept Evaluation
LAR-13143 B84-10206 09
COST ESTIMATES
Price Estimation Guidelines
NPO-15569 B84-10186 08
Software Cost-Estimation Model
NPO-15862 B84-10209 09
COUNTERSINKING
Countersink Drill
MFS-19852 B84-10163 07
COUPLING
Remote Coupling of Electrical Connectors
MSC-20414 B84-10363 07
COUPLING CIRCUITS
Powerline Coupler for Windmill Motor/Generators
MFS-25944 B84-10010 01
COUPLINGS
High-Pressure Coupling for Open-Ended Tubes
MSC-20451 B84-10326 06
Hybrid-Vehicle Transmission System
NPO-16119 B84-10372 07
CRACK PROPAGATION
Double Linear Damage Rule for Fatigue Analysis
LEW-14058 B84-10103 06
CRACKING (FRACTURING)
Coal-Face Fracture With A Two-Phase Liquid
NPO-15849 B84-10090 04
CROSSTALK
Convolutionally-Coded Unbalanced QPSK Systems
NPO-15566 B84-10267 02
CRYOGENIC COOLING
Sealing Mechanical Cryogenic Coolers
NPO-15139 B84-10149 07
CRYSTAL DEFECTS
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04
CRYSTAL GROWTH
Eutectic-Alloy Morphology
MFS-25937 B84-10084 04
Two-Crucible Czochralski Process
NPO-15110 B84-10170 08
Minimizing Convection During Crystal Growth
NPO-15811 B84-10194 08
Gravitational Effects on Crystal Growth by Vapor Transport
NPO-15853 B84-10391 08
Contoured Orifice for Silicon-Ribbon Die
NPO-15126 B84-10394 08
CRYSTALLIZATION
Reciprocating Crystallizer
MFS-25948 B84-10196 08
CURRENT REGULATORS
Hall-Effect Ground-Fault Interruptor
NPO-15915 B84-10255 01
CURVED PANELS
Prestressed Thermal-Protection Panels
MSC-20254 B84-10382 08
Strong, Lighweight Curved Panels
MSC-16278 B84-10399 08
CUTTERS
Square-Cutting Grinder
KSC-11257 B84-10199 08
Stripping the Sheath From Stranded Cables
NPO-15082 B84-10390 08
CUTTING
Automatically Dressing Blades in Silicon-Wafer Cutting
NPO-15745 B84-10174 08
CYLINDRICAL SHELLS
Quick-Change Holder for Aeronautical-Research Microphones
FRC-11072 B84-10347 06
CZOCHRALSKI METHOD
Two-Crucible Czochralski Process
NPO-15110 B84-10170 08

D

DAMAGE
Reversing Optical Damage In LiNbO3 Switches
NPO-16239 B84-10227 01
DAMPING
Transient Response Analysis
MSC-20590 B84-10135 06
Improved Coulomb-Friction Damper
MSC-20505 B84-10332 06
DATA ACQUISITION
Fast Dual Analog-to-Digital Converter
NPO-15006 B84-10026 02
Acquisition of Dynamic Stress/Strain Data
MSC-20589 B84-10122 06
DATA BASE MANAGEMENT SYSTEMS
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
Integrated Procurement Management System, Version II
MSC-20278 B84-10211 09
DATA BASES
Computerized Interactive Harness Engineering
NPO-16272 B84-10014 01
DATA MANAGEMENT
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
DATA SYSTEMS
Programable Multicrate Controller
MFS-25533 B84-10042 02
Optical Mass Memory System Specification
MFS-25592 B84-10047 02
DATA TRANSMISSION
Intercomputer Communication Link
NPO-13446 B84-10029 02
DECODERS
Real-Time Reed-Solomon Decoder
NPO-15982 B84-10228 01
DECODING
Simplified Convolution Codes
NPO-16251 B84-10418 09
DECONTAMINATION
Decontaminating Aluminum/Ammonia Heat Pipes
NPO-16066 B84-10179 08
DELAMINATING
Welding Many Thin Metal Layers
MSC-20698 B84-10398 08
DENDRITIC CRYSTALS
Impurity Effects on Dendritic Growth
MFS-25672 B84-10197 08
DENSITY MEASUREMENT
Gas-Density Gage
MFS-28011 B84-10353 06
DESALINIZATION
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03
DESCENT TRAJECTORIES
Fuel-Conservative Descents Using A Programable Calcultor
LAR-13138 B84-10333 06
DESIGN ANALYSIS
Evaluating Solar Collectors
NPO-15733 B84-10068 03
Software Design Analyzer System
NPO-16234 B84-10210 09
More Efficient Structural Design by Optimality Criteria
NPO-15832 B84-10219 09
Ellipsoidal Balloon Antenna
NPO-15931 B84-10238 01
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03
DESULFURIZING
Desulfurization of Coal in Fluidized Beds
NPO-15924 B84-10303 04
DIAGRAMS
Root-Locus Algorithms
NPO-16154 B84-10221 09
DIALYSIS
Dialysis Extraction for Chromatography
NPO-15691 B84-10100 05
DIELECTRICS
Inert-Gas Electrical Discharge Machining
MFS-19778 B84-10162 07

Theoretical Investigation Of Dielectric Horn Antennas
GSC-12876 B84-10245 01
DIES
Selecting Flatpack Lead-Forming Dies
MFS-25951 B84-10141 06
Machining of Silicon-Ribbon-Forming Dies
NPO-15127 B84-10173 08
Contoured Orifice for Silicon-Ribbon Die
NPO-15126 B84-10394 08
DIESEL ENGINES
Testing Ceramics for Diesel Engines
NPO-15824 B84-10078 04
DIFFERENTIAL PRESSURE
Differential Pressure Helps Seal Ball Valve
MSC-20615 B84-10330 06
DIGITAL DATA
Parallel VLSI Architecture
NPO-16124 B84-10420 09
DIGITAL FILTERS
Fast Two-Dimensional Digital-Filter Hardware
MFS-25876 B84-10204 09
DIGITAL SYSTEMS
Optical Quantum Receiver For Binary Signals
NPO-15122 B84-10030 02
DIOPHANTINE EQUATION
Simplified Convolution Codes
NPO-16251 B84-10418 09
DIRECT POWER GENERATORS
Integrated Fuel Cell/Coal Gasifier
NPO-16062 B84-10314 04
DISPLAY DEVICES
A Visually Oriented Text Editor
NPO-15088 B84-10213 09
DISTANCE MEASURING EQUIPMENT
Measuring Clearance Indirectly
MFS-19875 B84-10355 06
DISTILLATION EQUIPMENT
Solar-Powered Water Distillation
NPO-15894 B84-10069 03
DIVERTERS
Diverter Lip for Seal
MFS-19891 B84-10168 07
DOCUMENTATION
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
DOLLIES
Forklift Support Dolly
GSC-12916 B84-10147 07
DOORS
Glass/Epoxy Door Panel for Automobiles
NPO-15057 B84-10389 08
DOPPLER EFFECT
Estimating Doppler Shifts for Synthetic-Aperture Radar
NPO-15990 B84-10264 02
DOPPLER RADAR
Report on Satellite Radar for Detecting Ocean Currents
NPO-15704 B84-10032 02
DRIFT RATE
Removing Drift From Frequency-Stability Measurements
NPO-15833 B84-10040 02
DRILLS
Countersink Drill
MFS-19852 B84-10163 07
DRY CELLS
Battery-Operated High-Voltage Power Supply
GSC-12818 B84-10001 01
DUST STORMS
Predicting Severe Duststorms
NPO-14999 B84-10411 09
DYNAMIC CHARACTERISTICS
Dynamic Simulation and Stability Analysis
GSC-12810 B84-10123 06
DYNAMIC PRESSURE
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06
DYNAMIC RESPONSE
Transient Response Analysis
MSC-20590 B84-10135 06
Calculating Closed-Loop Sensitivity to Parameter Variations
NPO-15941 B84-10202 09
DYNAMIC STRUCTURAL ANALYSIS
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
DYNAMOMETERS
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07

E

EARTHQUAKE RESISTANT STRUCTURES
Active Pulse Suppression of Structural Vibrations
NPO-15788 B84-10340 06
ECOLOGY
Experimental Ecosystems Sealed in Glass
NPO-15712 B84-10097 05
ECONOMIC ANALYSIS
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08
ECOSYSTEMS
Experimental Ecosystems Sealed in Glass
NPO-15712 B84-10097 05
EDDY CURRENTS
Tube-Wall Thickness Detector
MFS-19741 B84-10024 01
Eddy-Current Inspection of Ball Bearings
MFS-25833 B84-10104 06
Eddy-Current Reference Standard
MFS-19824 B84-10138 06
Magnetic Despinning System
MFS-25966 B84-10166 07
Differential-Coil Eddy-Current Material Sorter
MFS-19872 B84-10231 01
EDITING
A Visually Oriented Text Editor
NPO-15088 B84-10213 09
ELASTIC PROPERTIES
Properties of Low-Expansion Laminates
MFS-25859 B84-10082 04
ELASTOMERS
Elastomer Encapsulant for Solar-Cell Arrays
NPO-15663 B84-10083 04
Predicting Polymer/Liquide Interactions
NPO-14874 B84-10312 04
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
ELECTRIC AUTOMOBILES
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07
ELECTRIC BATTERIES
Circuit for Monitoring Cell Voltages
MFS-25924 B84-10008 01
ELECTRIC BRIDGES
Platinum-Resistor Differential Temperature Sensor
NPO-15666 B84-10252 01
ELECTRIC CHOPPERS
Negatively Coupled Inductors for Odd-Phase Choppers
NPO-15380 B84-10017 01
ELECTRIC CONNECTORS
Wire-Identification Instrument
NPO-15633 B84-10027 02
ELECTRIC DISCHARGES
Improved Spark-Ignitor Circuitry
MFS-19751 B84-10019 01
Setup Aid for Electrical-Discharge Machining
MFS-19874 B84-10370 07
ELECTRIC GENERATORS
Front-End Program for SYSGEN
NPO-15782 B84-10036 02
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03
Thermoelectric Generator
NPO-16164 B84-10059 03
ELECTRIC HYBRID VEHICLES
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02
Hybrid-Vehicle Transmission System
NPO-16119 B84-10372 07
Power Train for Hybrid Electric Vehicle
NPO-15742 B84-10377 07
ELECTRIC MOTOR VEHICLES
Batteries for Electric Vehicles
NPO-15142 B84-10244 01
ELECTRIC MOTORS
Advanced dc-Traction-Motor Control System
NPO-16118 B84-10229 01
ELECTRIC PULSES
Eliminating False Signals From Electromechanical Keyboards
MSC-20429 B84-10044 02
Pulsed-Current Transducers
NPO-14048 B84-10251 01
ELECTRIC RELAYS
Solid-State Latching Relay
NPO-15028 B84-10250 01
ELECTRIC WIRE
Calculating Strain Relief in Electronic-Component Leads
MSC-20416 B84-10248 01
ELECTRICAL FAULTS
Testing for Solar-Array Hotspots
NPO-15596 B84-10073 03
ELECTRICAL GROUNDING
Estimation of Grounding-Strap Resistances
MSC-20694 B84-10241 01
ELECTRICAL MEASUREMENT
LRU Voltage Analysis
MSC-20699 B84-10035 02

ELECTRICAL RESISTIVITY
Measuring The Contact Resistances Of Photovoltaic Cells
NPO-16168 B84-10240 01
Estimation of Grounding-Strap Resistances
MSC-20694 B84-10241 01
ELECTROACOUSTIC TRANSDUCERS
Fabricating Underwater Electroacoustic Transducers
LAR-13007 B84-10381 08
ELECTROCHEMICAL CELLS
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
ELECTRODES
EDM Electrode for Internal Grooves
MFS-19733 B84-10369 07
ELECTROLYSIS
Molten-Salt Electrolysis
NPO-15535 B84-10320 04
ELECTROLYTES
Equation for Electrolyte Viscosity
NPO-15096 B84-10076 04
ELECTRON ATTACHMENT
Electron-Attachment Profiles
NPO-14865 B84-10299 03
ELECTRON BEAM WELDING
Welding Many Thin Metal Layers
MSC-20698 B84-10398 08
ELECTRON MICROSCOPES
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06
ELECTRON MOBILITY
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
ELECTRONIC CONTROL
Digital Sequence Controller
NPO-15725 B84-10012 01
Advanced dc-Traction-Motor Control System
NPO-16118 B84-10229 01
ELECTRONIC EQUIPMENT TESTS
Direct-Current Unbalance Detector
NPO-15978 B84-10007 01
ELECTRONIC MODULES
Real-Time Reed-Solomon Decoder
NPO-15982 B84-10228 01
ELECTROPHORESIS
Parameters Affecting Electrophoresis
MFS-25593 B84-10099 05
ELECTROPLATING
Polyurethane Masks Large Areas in Electroplating
MFS-19825 B84-10180 08
Increasing the Ductility of Electroplated Metals
MFS-19873 B84-10304 04
ELLIPTIC FUNCTIONS
Flight-Stability Extremes Calculated From the Uncertainty Ellipse
MSC-20308 B84-10409 09
ENCAPSULATING
Elastomer Encapsulant for Solar-Cell Arrays
NPO-15663 B84-10083 04
ENDOSCOPES
Imaging System For High-Temperature Processes
NPO-15945 B84-10273 02
ENERGY CONSERVATION
Reducing Stepping-Motor Power Consumption
MFS-25119 B84-10246 01
ENERGY CONVERSION EFFICIENCY
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
Thermoelectric Generator
NPO-16164 B84-10059 03
ENERGY STORAGE
Solar-Powered Flywheel
MFS-25978 B84-10157 07
ENGINE TESTS
Ignition-Spark Detector for Engine Testing
MFS-19890 B84-10365 07
ENGINEERING MANAGEMENT
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
ENVIRONMENT SIMULATION
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03
ENVIRONMENTAL MONITORING
Dialysis Extraction for Chromatography
NPO-15691 B84-10100 05
ENVIRONMENTAL TESTS
Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
ERROR ANALYSIS
Convolutionally-Coded Unbalanced QPSK Systems
NPO-15566 B84-10267 02
Determining The Slope Error Of A Parabolic Reflector
NPO-15713 B84-10280 03
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09
ERROR CORRECTING CODES
Reed-Solomon Encoder
NPO-16074 B84-10048 02
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
Simplified Convolution Codes
NPO-16251 B84-10418 09
ERROR CORRECTING DEVICES
Error Correction for Tandem Data-Transmission Paths
NPO-16125 B84-10417 09
ETCHING
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08
EUTECTIC ALLOYS
Eutectic-Alloy Morphology
MFS-25937 B84-10084 04
EUTECTIC COMPOSITES
Heat Storage and Transport
NPO-15468 B84-10291 03
Eutectic Contact Inks for Solar Cells
NPO-15171 B84-10305 04
EVALUATION
Safety Evaluation Methodology for Mining Systems
NPO-15831 B84-10375 07
EVAPORATORS
Sintered Lining for Heat-Pipe Evaporator
NPO-16172 B84-10118 06
EXCITATION
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
EXHAUST GASES
Integrated Exhaust-Gas-Analysis System
LEW-14062 B84-10337 06
EXPLOSIVE WELDING
Explosive Welding for Remote Applications
LAR-13119 B84-10397 08
EXTENSOMETERS
Acousto-optic Extensometer for Bolts
MFS-19914 B84-10336 06
EXTRACTION
Low-Temperature Extraction of Oil From Shale
NPO-15656 B84-10310 04
EYE EXAMINATIONS
Photographic Screening for Eye Defects
MFS-27045 B84-10322 05
EYE MOVEMENTS
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02

F

FABRICATION
Beam-Cap-Forming Machine
MFS-27007 B84-10183 08
FABRICS
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
FAILURE ANALYSIS
Testing for Solar-Array Hotspots
NPO-15596 B84-10073 03
FAN BLADES
Propeller Design Program
LAR-13141 B84-10371 07
FAR FIELDS
Acoustic Gaussian Far-Field Pattern
LAR-12967 B84-10051 03
FASTENERS
Standard Fastener Library
MSC-20645 B84-10153 07
Clamp Secures Material to Cylinder Base
MFS-19479 B84-10158 07
Tape-Mounted Thermocouple
NPO-16291 B84-10400 08
FATIGUE (MATERIALS)
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04
Double Linear Damage Rule for Fatigue Analysis
LEW-14058 B84-10103 06
FATIGUE LIFE
Structural Analysis of Cylindrical Thrust Chambers
LEW-13655 B84-10127 06
FEEDBACK CONTROL
Transfer-Function Simulator
NPO-15696 B84-10046 02
Improved Melt-Level Control System
NPO-15900 B84-10192 08
Silicon-Web-Growing Machine
NPO-15870 B84-10193 08
Acoustic Position Servosystem
NPO-15936 B84-10407 08
FIBER OPTICS
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06
Fiber-Optic Equipment for Power-System Control
NPO-15968 B84-10266 02
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08

Roof Polishing of Optical Fibers
LAR-13070 B84-10380 08
FIBER ORIENTATION
Splicing Efficiently Couples Optical Fibers
NPO-16294 B84-10403 08
FILE MAINTENANCE (COMPUTERS)
NASTRAN NASTPLT Plotting Post Processor
GSC-12833 B84-10215 09
FILLERS
Reusable Thermal Barrier for Insulation Gaps
MSC-20519 B84-10329 06
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
FILM THICKNESS
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
FINANCIAL MANAGEMENT
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03
Price Estimation Guidelines
NPO-15569 B84-10186 08
FINITE ELEMENT METHOD
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09
FIRE PREVENTION
Preventing Fires in Cryogenic Oxidizer Lines
MFS-19830 B84-10115 06
FITTING
Alining Heat-Exchanger Tubes for Assembly
MFS-19857 B84-10182 08
Fluorescent Gage Indication
ARC-11397 B84-10384 08
FLAT CONDUCTORS
Estimation of Grounding-Strap Resistances
MSC-20694 B84-10241 01
FLATNESS
Thermal-Balance Strip for Fluted LFC Panels
LAR-12991 B84-10345 06
FLEXIBILITY
Flexible Heat Pipe
GSC-12864 B84-10109 06
FLEXIBLE BODIES
Flexible Mirror Mount for Michelson Interferometer
NPO-15746 B84-10066 03
Dynamic Simulation and Stability Analysis
GSC-12810 B84-10123 06
Flexible Liquid-Transport Tube
NPO-15761 B84-10139 06
FLIGHT CHARACTERISTICS
Flight-Stability Extremes Calculated From the Uncertainty Ellipse
MSC-20308 B84-10409 09
FLOCCULATING
Purification of Solar Ponds
NPO-15397 B84-10295 03
FLOW CHARACTERISTICS
Sting-Mounted Flow Survey Apparatus
LAR-13157 B84-10334 06
FLOW DISTRIBUTION
Turbulent Recirculating Flows In Isothermal Combustor Geometries
LEW-13894 B84-10128 06
Computation of Three-Dimensional Combustor Performance
LEW-13930 B84-10129 06
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07
FLOW MEASUREMENT
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06
Measuring the Liquid Content of a Gas
MFS-25990 B84-10343 06
FLOW VISUALIZATION
Surface-Streamline Flow Visualization
LEW-13875 B84-10105 06
FLUID FLOW
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03
FLUIDIZED BED PROCESSORS
Fluidized-Bed Reactor System
NPO-15975 B84-10087 04
FLUORESCENCE
Fluorescent Gage Indication
ARC-11397 B84-10384 08
FLUSHING
Setup Aid for Electrical-Discharge Machining
MFS-19874 B84-10370 07
FLYWHEELS
Solar-Powered Flywheel
MFS-25978 B84-10157 07
FOAMS
Polyurethane-Foam Maskant
MFS-19786 B84-10091 04
FOCUSING
Point-Focusing Solar-Power Distributed Receivers
NPO-15578 B84-10294 03
FOLDING STRUCTURES
Stowable Solar-Cell Array
NPO-15893 B84-10020 01
Joint For Erectable and Collapsible Frames
MSC-20635 B84-10119 06
Collapsible and Deployable Trusses
MFS-25945 B84-10177 08
Synchronously Deployable Truss
LAR-13117 B84-10350 06
Deployable Geodesic Truss
LAR-13113 B84-10351 06
FORCE DISTRIBUTION
Forklift Support Dolly
GSC-12916 B84-10147 07
FORECASTING
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
Predicting Severe Duststorms
NPO-14999 B84-10411 09
FORMING TECHNIQUES
Beam-Cap-Forming Machine
MFS-27007 B84-10183 08
Silicon Formation for Solar Cells
NPO-14973 B84-10313 04
FOULING
Monitoring Marine Microbial Fouling
MFS-25928 B84-10096 05
Heat-Exchanger Computational Procedure For Temperature-Dependent Fouling
LEW-13874 B84-10126 06
FRAMES
Joint For Erectable and Collapsible Frames
MSC-20635 B84-10119 06
FREQUENCY DISCRIMINATORS
Discriminator Aids Phase-Lock Acquisition
NPO-14311 B84-10233 01
FREQUENCY MEASUREMENT
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
Insulation Debond Detection
MFS-25862 B84-10324 06
FREQUENCY MODULATION
Temperature Compensation for a Frequency-Modulated Oscillator
MSC-20556 B84-10249 01
FREQUENCY MULTIPLIERS
Normalizing VFO Frequency by Non-Powr-of-2 Division
NPO-15330 B84-10049 02
FREQUENCY SHIFT
Frequency-Modulation Correlation Spectrometer
NPO-15558 B84-10061 03
FREQUENCY STABILITY
Removing Drift From Frequency-Stability Measurements
NPO-15833 B84-10040 02
Adjustable-Frequency Spectrophone Laser Stabilization
NPO-15516 B84-10067 03
FRESH WATER
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03
FRESNEL LENSES
Fresnel-Lens/Heat-Storage System
NPO-16242 B84-10289 03
FRICTION MEASUREMENT
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07
FUEL CELLS
Integrated Fuel Cell/Coal Gasifier
NPO-16062 B84-10314 04
FUEL CONSUMPTION
The Effect of Wind on the Aerodynamic Resistance of Highway Vehicles
NPO-14771 B84-10152 07
Fuel-Conservative Descents Using A Programable Calcultor
LAR-13138 B84-10333 06
FUEL TESTS
Rapid Freezing-Point Measurement
LEW-14019 B84-10279 03
FUEL VALVES
A Positive-Shutoff Fuel Valve
MFS-19779 B84-10145 06
Garter Valves
MFS-19899 B84-10359 07
FUEL-AIR RATIO
Measuring Absolute Oxygen Pressure
NPO-16131 B84-10113 06
FURNACES
Temperature-Gradient Furnace for Solidification Experiments
MFS-25963 B84-10101 06
Improved Ellipsoidal Radiation Furnace
MFS-25933 B84-10102 06

FUSELAGES
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06
FUSES (ORDNANCE)
Burnwire Simulator
NPO-15883 B84-10021 01
FUSION WELDING
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08

G

GAS ANALYSIS
Laser Pollutant-Measuring Systems
NPO-16101 B84-10285 03
Electron-Attachment Profiles
NPO-14865 B84-10299 03
Integrated Exhaust-Gas-Analysis System
LEW-14062 B84-10337 06
GAS DENSITY
Gas-Density Gage
MFS-28011 B84-10353 06
GAS DYNAMICS
Measuring the Liquid Content of a Gas
MFS-25990 B84-10343 06
GAS EXPANSION
Two-Phase Wet/Dry Engine for Waste-Heat Recovery
NPO-15621 B84-10164 07
GAS FLOW
Conserving Purge Gases
MFS-19625 B84-10140 06
Constant-Operating-Resistance Wire Probe
LAR-13144 B84-10341 06
GAS LASERS
Adjustable-Frequency Spectrophone Laser Stabilization
NPO-15516 B84-10067 03
GAS POCKETS
Detection of Gas Slugs in Heat Pipes
NPO-16064 B84-10144 06
GAS TURBINE ENGINES
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
GASEOUS DIFFUSION
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04
GASIFICATION
Solar-Heated Gasifier
NPO-15071 B84-10293 03
GATES (CIRCUITS)
Optical Logic Gates
NPO-15134 B84-10003 01
GEOMETRICAL OPTICS
A General Optical Systems Evaluation Program
GSC-12823 B84-10057 03
GETTERS
Activated Internal Gettering
NPO-15530 B84-10316 04
GLASS
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04
GLASS FIBERS
Containerless Manufacture of Glass Optical Fibers
MFS-25905 B84-10075 04
Pure Glasses From Multicomponent Gels
NPO-16160 B84-10079 04
GRAPHITE-EPOXY COMPOSITES
Reducing Thermal Expansivity of Composite Panels
MFS-25793 B84-10117 06
Efficient Joints for Graphite/Epoxy Structures
LAR-13091 B84-10121 06
Strong, Lighweight Curved Panels
MSC-16278 B84-10399 08
GRAVITATIONAL EFFECTS
Gravitational Effects on Crystal Growth by Vapor Transport
NPO-15853 B84-10391 08
GRINDING MACHINES
Magnetic Chuck for Precise Grinding
MFS-19764 B84-10191 08
Square-Cutting Grinder
KSC-11257 B84-10199 08
GUARDS (SHIELDS)
Guard For Fuse Caps
KSC-11283 B84-10243 01
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07

H

HALL EFFECT
Hall-Effect Ground-Fault Interruptor
NPO-15915 B84-10255 01
HARDNESS
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
HARMONICS
Negatively Coupled Inductors for Odd-Phase Choppers
NPO-15380 B84-10017 01
HEART IMPLANTATION
Transducers For Heat Research
NPO-15095 B84-10094 05
HEAT EXCHANGERS
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
Heat-Exchanger Computational Procedure For Temperature-Dependent Fouling
LEW-13874 B84-10126 06
A Ceramic Heat Exchanger for Solar Receivers
NPO-15771 B84-10296 03
HEAT OF VAPORIZATION
Solar-Power System Produces High-Pressure Steam
NPO-15434 B84-10288 03
HEAT PIPES
Flexible Heat Pipe
GSC-12864 B84-10109 06
Uniform-Temperature Walls for Cloud Chambers
MFS-25931 B84-10110 06
Detection of Gas Slugs in Heat Pipes
NPO-16064 B84-10144 06
Decontaminating Aluminum/Ammonia Heat Pipes
NPO-16066 B84-10179 08
HEAT RADIATORS
Solar Shutter
NPO-15428 B84-10292 03
HEAT RESISTANT ALLOYS
Lightweight High-Temperature Thermal Insulation
MFS-19754 B84-10306 04
HEAT STORAGE
Fresnel-Lens/Heat-Storage System
NPO-16242 B84-10289 03
Heat Storage and Transport
NPO-15468 B84-10291 03
HEAT TRANSFER
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06
HEAT TREATMENT
Vacuum Baking To Remove Volatile Materials
NPO-15648 B84-10080 04
Reducing Thermal Expansivity of Composite Panels
MFS-25793 B84-10117 06
HESSIAN MATRICES
Algorithm Solves Constrained and Unconstrained Optimization Problems
MSC-20683 B84-10216 09
HIERARCHIES
Software-Implementation Plan
NPO-16123 B84-10223 09
HIGH LEVEL LANGUAGES
Language for Allocation and Network Scheduling
MSC-20633 B84-10212 09
HIGH PRESSURE
High-Pressure Coupling for Open-Ended Tubes
MSC-20451 B84-10326 06
HIGH TEMPERATURE FLUIDS
High-Temperature Pump
NPO-15783 B84-10376 07
HIGH TEMPERATURE TESTS
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06
Brazing Alloys Indicate Turbomachinery Temperatures
MFS-19792 B84-10327 06
HIGH VOLTAGES
Battery-Operated High-Voltage Power Supply
GSC-12818 B84-10001 01
HOLDERS
Clamp Secures Material to Cylinder Base
MFS-19479 B84-10158 07
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06
Quick-Change Holder for Aeronautical-Research Microphones
FRC-11072 B84-10347 06
HORN ANTENNAS
Efficient Reflector Antenna
NPO-16262 B84-10239 01
Theoretical Investigation Of Dielectric Horn Antennas
GSC-12876 B84-10245 01
HOT PRESSING
Increasing the Ductility of Electroplated Metals
MFS-19873 B84-10304 04
HOT-WIRE ANEMOMETERS
Constant-Operating-Resistance Wire Probe
LAR-13144 B84-10341 06

Measuring the Liquid Content of a Gas
MFS-25990 B84-10343 06

HOUSINGS
Guard For Fuse Caps
KSC-11283 B84-10243 01

HYDROGEN MASERS
Removing Drift From Frequency-Stability Measurements
NPO-15833 B84-10040 02

HYDROLYSIS
Aquatic Plants Aid Sewage Filter
MFS-25808 B84-10095 05

I

IGNITERS
Improved Spark-Ignitor Circuitry
MFS-19751 B84-10019 01
Ignition-Spark Detector for Engine Testing
MFS-19890 B84-10365 07

IMAGE ENHANCEMENT
Fast Two-Dimensional Digital-Filter Hardware
MFS-25876 B84-10204 09

IMAGE FILTERS
Soft-X-Ray Prefilter for Hot, Bright Objects
NPO-15972 B84-10060 03

IMAGE RESOLUTION
Report on Satellite Radar for Detecting Ocean Currents
NPO-15704 B84-10032 02
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02

IMAGING TECHNIQUES
Remote-Imaging Parameters
NPO-14869 B84-10041 02
Measuring Tracking Accuracy of CCD Imagers
NPO-15665 B84-10260 02
Imaging System For High-Temperature Processes
NPO-15945 B84-10273 02
Quicker Selection of CCD Images
NPO-15345 B84-10274 02
High-Resolution vice Camera
NPO-15086 B84-10275 02
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03

IMPACT TESTS
Insulation Debond Detection
MFS-25862 B84-10324 06

IMPACT TOLERANCES
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06

IMPEDANCE MATCHING
Matching Impedances and Modes in Acoustic Levitation
NPO-16022 B84-10184 08

IMPURITIES
Impurity Effects on Dendritic Growth
MFS-25672 B84-10197 08

INCLUSIONS
Reducing Liquid Permeation Through Polymer Sheets
NPO-15802 B84-10089 04

INDUCTION HEATING
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08

INDUCTORS
Negatively Coupled Inductors for Odd-Phase Choppers
NPO-15380 B84-10017 01

INFORMATION DISSEMINATION
NASTRAN NASTPLT Plotting Post Processor
GSC-12833 B84-10215 09
Interactive Digital Signal Processor
GSC-12862 B84-10268 02

INFORMATION FLOW
Packet Telemetry and Packet Telecommand
NPO-16301 B84-10276 02

INFORMATION MANAGEMENT
Computerized Interactive Harness Engineering
NPO-16272 B84-10014 01
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
Communication Program Emulates Switchboard
MFS-19917 B84-10270 02
Managing Software Design and Design Changes
NPO-15331 B84-10416 09

INFORMATION RETRIEVAL
Library Information-Processing System
GSC-12861 B84-10414 09

INFORMATION SYSTEMS
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09

INFRARED SPECTRA
A Sensitive Infrared Photodetector
NPO-15926 B84-10022 01

INFRARED TRACKING
Integrated Laser and Light Detector
NPO-15943 B84-10230 01

INJECTION LASERS
Integrated Laser and Light Detector
NPO-15943 B84-10230 01

INORGANIC CHEMISTRY
Making Pure Fine-Grained Inorganic Powder
NPO-16398 B84-10086 04

INORGANIC COATINGS
High-Temperature Coating for Titanium
NPO-16222 B84-10311 04

INPUT/OUTPUT ROUTINES
Software for PROM Programing
MSC-20641 B84-10013 01
Communication Program Emulates Switchboard
MFS-19917 B84-10270 02

INSERTION
Tool for Inserting and Removing Tube Plugs
MFS-19871 B84-10364 07

INSERTS
Annular-Tube Reinforcer
MFS-19738 B84-10201 08

INSPECTION
Fluorescent Gage Indication
ARC-11397 B84-10384 08
Edge Labels for Multilayer Circuit Boards
MSC-20704 B84-10388 08

INSTALLING
Connector-Array Attachment Matrix
NPO-15778 B84-10401 08

INSTRUCTION SETS (COMPUTERS)
Software-Implementation Plan
NPO-16123 B84-10223 09

INTEGRATED CIRCUITS
Circuit for Monitoring Cell Voltages
MFS-25924 B84-10008 01
Parallel VLSI Architecture
NPO-16124 B84-10420 09

INTERFACES
Intercomputer Communication Link
NPO-13446 B84-10029 02

INTERFEROMETERS
Interferometer Measures Broadband Surface Acoustic Waves
LAR-12966 B84-10050 03
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06
Interferometer for Measuring Acoustic Signals
LAR-13030 B84-10281 03

INTERFEROMETRY
Thermal-Expansion Measurement
MFS-27000 B84-10064 03

INTERPROCESSOR COMMUNICATION
Communication Program Emulates Switchboard
MFS-19917 B84-10270 02

ION BEAMS
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08

IONIZERS
Zero-Net-Charge Air Ionizer
NPO-15937 B84-10054 03
Measuring Air-Ionizer Output
NPO-16058 B84-10242 01

IONOSPHERIC CROSS MODULATION
Calibrating for Ionospheric Phase Delays
NPO-15430 B84-10297 03

IRRADIANCE
Ten Thousand Solar Constants Radiometer
NPO-15922 B84-10290 03

ISOLATION
Improved RF Isolation Amplifier
NPO-16026 B84-10011 01

ISOLATORS
Stable Optocoupler
MFS-25927 B84-10226 01

ISOSTATIC PRESSURE
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04

J

JET MIXING FLOW
Prewhirl Jet Model
MFS-19826 B84-10136 06

JOINTS (JUNCTIONS)
Joint For Erectable and Collapsible Frames
MSC-20635 B84-10119 06
Efficient Joints for Graphite/Epoxy Structures
LAR-13091 B84-10121 06

K

KEYING
Eliminating False Signals From Electromechanical Keyboards
MSC-20429 B84-10044 02

L

LAMINAR FLOW
Surface-Streamline Flow Visualization
LEW-13875 B84-10105 06
LAMINATES
Properties of Low-Expansion Laminates
MFS-25859 B84-10082 04
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
Improved Optical Keyboard
NPO-15132 B84-10254 01
LANGUAGE PROGRAMMING
Language for Allocation and Network Scheduling
MSC-20633 B84-10212 09
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
LANGUAGES
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
LAP JOINTS
Efficient Joints for Graphite/Epoxy Structures
LAR-13091 B84-10121 06
LARGE SCALE INTEGRATION
Reed-Solomon Encoder
NPO-16074 B84-10048 02
LASER APPLICATIONS
Acousto-optic Extensometer for Bolts
MFS-19914 B84-10336 06
LASER RANGE FINDERS
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03
LASER STABILITY
Adjustable-Frequency Spectrophone Laser Stabilization
NPO-15516 B84-10067 03
LASERS
Precise Control of a Tunable IR Diode Laser
NPO-16000 B84-10023 01
Laser Pollutant-Measuring Systems
NPO-16101 B84-10285 03
LATCHES
Solid-State Latching Relay
NPO-15028 B84-10250 01
Snapring Quick Fastener
NPO-15724 B84-10402 08
LATTICE PARAMETERS
Coilable-Column Development
MFS-27032 B84-10142 06
LEAD ACID BATTERIES
Mathematical Storage-Battery Models
NPO-15615 B84-10018 01
LEAKAGE
Microphone Detects Boiler-Tube Leaks
NPO-16027 B84-10348 06
LIAPUNOV FUNCTIONS
Calculating Closed-Loop Sensitivity to Parameter Variations
NPO-15941 B84-10202 09
LIBRARIES
Standard Fastener Library
MSC-20645 B84-10153 07
Library Information-Processing System
GSC-12861 B84-10414 09
LIFE (DURABILITY)
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
LIFE CYCLE COSTS
Cost and Performance of Distributed Photovoltaic Systems
NPO-16001 B84-10033 02
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02
LIFTING BODIES
Forklift Support Dolly
GSC-12916 B84-10147 07
LIGHT TRANSMISSION
Angle-Measurement and Ranging System
MFS-25912 B84-10053 03
LIGHTNING
Lightning Protection for Composite Aircraft Structures
LAR-12879 B84-10120 06
Bolt Inserts for Lightning Protection
MFS-25918 B84-10156 07
Detecting The Polarity Of Lightning Strikes
NPO-16063 B84-10247 01
LINEAR CIRCUITS
Pulsed-Current Transducers
NPO-14048 B84-10251 01
LINEAR EQUATIONS
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
LININGS
Testing Ceramics for Diesel Engines
NPO-15824 B84-10078 04
Sintered Lining for Heat-Pipe Evaporator
NPO-16172 B84-10118 06
LINKAGES
Capture-Range Indicator
MFS-28008 B84-10354 06
LIQUID FLOW
Flexible Liquid-Transport Tube
NPO-15761 B84-10139 06
LIQUID LEVELS
Improved Melt-Level Control System
NPO-15900 B84-10192 08
LIQUID PHASES
Coal-Face Fracture With A Two-Phase Liquid
NPO-15849 B84-10090 04
LIQUID-SOLID INTERFACES
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03
Reducing Liquid Permeation Through Polymer Sheets
NPO-15802 B84-10089 04
LOAD DISTRIBUTION (FORCES)
Measuring Side Loads On Bolts
NPO-15705 B84-10137 06
LOGIC CIRCUITS
Optical Logic Gates
NPO-15134 B84-10003 01
LONGERONS
Coilable-Column Development
MFS-27032 B84-10142 06
LOW PRESSURE
Inexpensive Pressure-Relief Valve
MSC-20518 B84-10155 07

M

MACHINE TOOLS
Countersink Drill
MFS-19852 B84-10163 07
Machining of Silicon-Ribbon-Forming Dies
NPO-15127 B84-10173 08
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07
MACHINING
Setup Aid for Electrical-Discharge Machining
MFS-19874 B84-10370 07
MAGAZINES (SUPPLY CHAMBERS)
Optical Mass Memory System Specification
MFS-25592 B84-10047 02
MAGIC TEES
Magic-T-Coupled Magnetrons
NPO-15061 B84-10235 01
MAGNETIC MATERIALS
Eddy-Current Reference Standard
MFS-19824 B84-10138 06
MAGNETIC RECORDING
Detecting The Polarity Of Lightning Strikes
NPO-16063 B84-10247 01
MAGNETRONS
Magic-T-Coupled Magnetrons
NPO-15061 B84-10235 01
MAGNETS
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04
MAINTENANCE
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08
MANAGEMENT METHODS
Software-Implementation Plan
NPO-16123 B84-10223 09
MANAGEMENT SYSTEMS
Integrated Procurement Management System, Version II
MSC-20278 B84-10211 09
MANUFACTURING
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08
MAPPING
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02
MARINE BIOLOGY
Monitoring Marine Microbial Fouling
MFS-25928 B84-10096 05
MARKING
Edge Labels for Multilayer Circuit Boards
MSC-20704 B84-10388 08
MASKS
Polyurethane-Foam Maskant
MFS-19786 B84-10091 04
Polyurethane Masks Large Areas in Electroplating
MFS-19825 B84-10180 08

MASS RATIOS
Pump-Fed Versus Pressure-Fed Propulsion
NPO-15190 B84-10062 03
MATERIAL ABSORPTION
Predicting Polymer/Liquide Interactions
NPO-14874 B84-10312 04
MATERIALS RECOVERY
Inhibiting Wet Oxidation of Ammonia
ARC-11407 B84-10307 04
MEASURING INSTRUMENTS
Monitoring Performance of Complex Systems
KSC-11273 B84-10031 02
Measuring The Contact Resistances Of Photovoltaic Cells
NPO-16168 B84-10240 01
MECHANICAL DEVICES
Remotely Operated Gripper Tracks Applied Force
MSC-20241 B84-10159 07
MECHANICAL DRIVES
Remote Coupling of Electrical Connectors
MSC-20414 B84-10363 07
MEDICAL EQUIPMENT
Transducers For Heat Research
NPO-15095 B84-10094 05
Probe Follower for Moving Blood Vessels
NPO-15898 B84-10321 05
Photographic Screening for Eye Defects
MFS-27045 B84-10322 05
MEDICAL SERVICES
Estimating Health Services Requirements
NPO-14151 B84-10098 05
MELTING POINTS
Rapid Freezing-Point Measurement
LEW-14019 B84-10279 03
MELTS (CRYSTAL GROWTH)
Two-Crucible Czochralski Process
NPO-15110 B84-10170 08
Improved Melt-Level Control System
NPO-15900 B84-10192 08
Reciprocating Crystallizer
MFS-25948 B84-10196 08
METAL COATINGS
Preventing Fires in Cryogenic Oxidizer Lines
MFS-19830 B84-10115 06
METAL CUTTING
Square-Cutting Grinder
KSC-11257 B84-10199 08
METAL FILMS
Hot-Dipped Metal Films as Epitaxial Substrates
NPO-15904 B84-10178 08
METAL FOILS
Brazing Alloys Indicate Turbomachinery Temperatures
MFS-19792 B84-10327 06
MICHELSON INTERFEROMETERS
Flexible Mirror Mount for Michelson Interferometer
NPO-15746 B84-10066 03
MICROBIOLOGY
Experimental Ecosystems Sealed in Glass
NPO-15712 B84-10097 05
MICROPHONES
Microphone Detects Boiler-Tube Leaks
NPO-16027 B84-10348 06
In-Place Calibration of Instrumentation Microphones
ARC-11463 B84-10349 06
MICROSCOPY
Monitoring Marine Microbial Fouling
MFS-25928 B84-10096 05
MICROSTRIP TRANSMISSION LINES
Circularly-Polarized Microstrip Antenna
NPO-15875 B84-10009 01
MICROWAVE COUPLING
X-Band Strip-Line Power Divider/Combiner
NPO-16086 B84-10002 01
Magic-T-Coupled Magnetrons
NPO-15061 B84-10235 01
MICROWAVE SWITCHING
Light-Activated Microwave Device
NPO-16112 B84-10234 01
MINING
Coal-Face Fracture With A Two-Phase Liquid
NPO-15849 B84-10090 04
Automatic Coal-Mining System
NPO-15861 B84-10151 07
Pillar-Trimming System
NPO-15848 B84-10160 07
Safety Evaluation Methodology for Mining Systems
NPO-15831 B84-10375 07
MINORITY CARRIERS
Activated Internal Gettering
NPO-15530 B84-10316 04
MISALIGNMENT
X-Ray Determination of Weld Misalinement
MSC-20418 B84-10323 06
MIXTURES
Eutectic Contact Inks for Solar Cells
NPO-15171 B84-10305 04
MOLDING MATERIALS
Vented Compression Molding of Granule-Filled Resins
MFS-25975 B84-10181 08
MOLECULAR BEAM EPITAXY
Preparing InSb Substrates
NPO-16127 B84-10317 04
MOLTEN SALTS
Molten-Salt Electrolysis
NPO-15535 B84-10320 04
MORPHOLOGY
Eutectic-Alloy Morphology
MFS-25937 B84-10084 04
MOTION PERCEPTION
Probe Follower for Moving Blood Vessels
NPO-15898 B84-10321 05
MOUNTING
Quick-Change Holder for Aeronautical-Research Microphones
FRC-11072 B84-10347 06
Solder Bonding for Power Transistors
MSC-20570 B84-10387 08
MULTIPLEXING
Wire-Identification Instrument
NPO-15633 B84-10027 02
MULTIPROCESSING (COMPUTERS)
Controlling Solar-Power Systems With Distributed Processors
NPO-15101 B84-10259 02
MULTISTATIC RADAR
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02

N

NAVIGATION
Low-Frequency Navigational System
NPO-15264 B84-10045 02
Angle-Measurement and Ranging System
MFS-25912 B84-10053 03
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
NETWORK ANALYSIS
Thermal Radiation Analyzer
MSC-20448 B84-10133 06
NEUTRALIZERS
Zero-Net-Charge Air Ionizer
NPO-15937 B84-10054 03
NEWTON-RAPHSON METHOD
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09
NICKEL IRON BATTERIES
Batteries for Electric Vehicles
NPO-15142 B84-10244 01
NICKEL ZINC BATTERIES
Batteries for Electric Vehicles
NPO-15142 B84-10244 01
NOISE PREDICTION
Predictive Smoothing-Convolution Algorithm
MSC-20604 B84-10419 09
NOISE REDUCTION
Eliminating False Signals From Electromechanical Keyboards
MSC-20429 B84-10044 02
NORMAL DENSITY FUNCTIONS
Acoustic Gaussian Far-Field Pattern
LAR-12967 B84-10051 03

O

O RING SEALS
Tapered Ring Seal
LEW-10455 B84-10361 07
OCEAN CURRENTS
Report on Satellite Radar for Detecting Ocean Currents
NPO-15704 B84-10032 02
ON-LINE SYSTEMS
Monitoring Performance of Complex Systems
KSC-11273 B84-10031 02
ONBOARD EQUIPMENT
LRU Voltage Analysis
MSC-20699 B84-10035 02
OPTICAL COMMUNICATION
Optical Quantum Receiver For Binary Signals
NPO-15122 B84-10030 02
Direct-Photon-Detection Communications
NPO-15905 B84-10256 02
Short-Range Digital Optical Links
NPO-15999 B84-10269 02
OPTICAL CORRECTION PROCEDURE
Reversing Optical Damage In LiNbO3 Switches
NPO-16239 B84-10227 01
OPTICAL COUPLING
Stable Optocoupler
MFS-25927 B84-10226 01
Multipurpose Photonic Transducers
NPO-15135 B84-10338 06
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08

Roof Polishing of Optical Fibers
LAR-13070 B84-10380 08
Splicing Efficiently Couples Optical Fibers
NPO-16294 B84-10403 08

OPTICAL MEASUREMENT
Thermal-Expansion Measurement
MFS-27000 B84-10064 03
Selecting Flatpack Lead-Forming Dies
MFS-25951 B84-10141 06

OPTICAL MEMORY (DATA STORAGE)
Optical Mass Memory System Specification
MFS-25592 B84-10047 02

OPTICAL PATHS
A General Optical Systems Evaluation Program
GSC-12823 B84-10057 03

OPTICAL REFLECTION
Improved Optical Keyboard
NPO-15132 B84-10254 01
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03

OPTICAL TRACKING
Integrated Laser and Light Detector
NPO-15943 B84-10230 01
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03

OPTIMIZATION
Algorithm Solves Constrained and Unconstrained Optimization Problems
MSC-20683 B84-10216 09
More Efficient Structural Design by Optimality Criteria
NPO-15832 B84-10219 09

OPTOGALVANIC SPECTROSCOPY
Monitoring of Reactive Atmospheric Species
NPO-15981 B84-10063 03

ORBIT CALCULATION
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

ORBITAL ELEMENTS
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09

ORBITAL MECHANICS
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06

ORIFICES
Contoured Orifice for Silicon-Ribbon Die
NPO-15126 B84-10394 08

OSCILLATIONS
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03

OSCILLATORS
Normalizing VFO Frequency by Non-Powr-of-2 Division
NPO-15330 B84-10049 02
Discriminator Aids Phase-Lock Acquisition
NPO-14311 B84-10233 01

OUTGASSING
Vacuum Baking To Remove Volatile Materials
NPO-15648 B84-10080 04

OXIDATION
Inhibiting Wet Oxidation of Ammonia
ARC-11407 B84-10307 04

OXYGEN TENSION
Measuring Absolute Oxygen Pressure
NPO-16131 B84-10113 06

P

PACKAGING
Holding Cargo in Place With Foam
MSC-20723 B84-10367 07

PACKET TRANSMISSION
Packet Telemetry and Packet Telecommand
NPO-16301 B84-10276 02

PANELS
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06
Thermal-Balance Strip for Fluted LFC Panels
LAR-12991 B84-10345 06
Glass/Epoxy Door Panel for Automobiles
NPO-15057 B84-10389 08

PARABOLIC REFLECTORS
Determining The Slope Error Of A Parabolic Reflector
NPO-15713 B84-10280 03
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03

PARALLEL FLOW
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07

PARAMETER IDENTIFICATION
Remote-Imaging Parameters
NPO-14869 B84-10041 02
Retrieval of Geophysical Parameters From Radiometric Data
NPO-16266 B84-10286 03

PARTICLE INTERACTIONS
Parameters Affecting Electrophoresis
MFS-25593 B84-10099 05

PARTITIONS (MATHEMATICS)
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09

PAYLOAD TRANSFER
Capture-Range Indicator
MFS-28008 B84-10354 06

PEDALS
Safety Pedal for Foot-Operated Machinery
MSC-20535 B84-10356 07

PELTIER EFFECTS
Faster Response for Memory-Metal Actuators
NPO-16120 B84-10148 07

PERFORATED SHELLS
Vented Compression Molding of Granule-Filled Resins
MFS-25975 B84-10181 08

PERFORMANCE PREDICTION
Mathematical Storage-Battery Models
NPO-15615 B84-10018 01
Cost and Performance of Distributed Photovoltaic Systems
NPO-16001 B84-10033 02
Safety Evaluation Methodology for Mining Systems
NPO-15831 B84-10375 07

PERFORMANCE TESTS
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03

PERMEABILITY
Reducing Liquid Permeation Through Polymer Sheets
NPO-15802 B84-10089 04

PERT
Software Cost-Estimation Model
NPO-15862 B84-10209 09

PHASE DETECTORS
Temperature-Stabilized Phase Detector
NPO-15766 B84-10016 01

PHASE ERROR
Convolutionally-Coded Unbalanced QPSK Systems
NPO-15566 B84-10267 02
Calibrating for Ionospheric Phase Delays
NPO-15430 B84-10297 03

PHASE LOCKED SYSTEMS
Normalizing VFO Frequency by Non-Powr-of-2 Division
NPO-15330 B84-10049 02
Discriminator Aids Phase-Lock Acquisition
NPO-14311 B84-10233 01

PHASE MODULATION
Frequency-Modulation Correlation Spectrometer
NPO-15558 B84-10061 03

PHASE SHIFT
Estimating Doppler Shifts for Synthetic-Aperture Radar
NPO-15990 B84-10264 02

PHASED ARRAYS
Semiconductor Laser Phased Array
NPO-15963 B84-10006 01

PHOTODETACHMENT
A Sensitive Infrared Photodetector
NPO-15926 B84-10022 01

PHOTOELECTRIC GENERATORS
Controlling Solar-Power Systems With Distributed Processors
NPO-15101 B84-10259 02

PHOTOELECTRON SPECTROSCOPY
Electron-Attachment Profiles
NPO-14865 B84-10299 03

PHOTOGRAPHIC EQUIPMENT
Photographic Screening for Eye Defects
MFS-27045 B84-10322 05

PHOTOMETERS
A Sensitive Infrared Photodetector
NPO-15926 B84-10022 01
Ignition-Spark Detector for Engine Testing
MFS-19890 B84-10365 07

PHOTONICS
Optical Logic Gates
NPO-15134 B84-10003 01
Direct-Photon-Detection Communications
NPO-15905 B84-10256 02
Multipurpose Photonic Transducers
NPO-15135 B84-10338 06

PHOTOVOLTAIC CELLS
Stowable Solar-Cell Array
NPO-15893 B84-10020 01
Assessing the Performance of Solar Arrays
NPO-15277 B84-10070 03
Elastomer Encapsulant for Solar-Cell Arrays
NPO-15663 B84-10083 04

Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
PHOTOVOLTAIC CONVERSION
Cost and Performance of Distributed Photovoltaic Systems
NPO-16001 B84-10033 02
PHYSIOCHEMISTRY
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04
PINS
Stepped-Pin Clevis Resists Jamming
NPO-15834 B84-10146 07
PIPES (TUBES)
Flexible Liquid-Transport Tube
NPO-15761 B84-10139 06
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08
High-Pressure Coupling for Open-Ended Tubes
MSC-20451 B84-10326 06
PLASTIC COATINGS
Applying Uniform Polymer Coatings To Microspheres
NPO-16075 B84-10308 04
PLASTIC DEFORMATION
Structural Analysis of Cylindrical Thrust Chambers
LEW-13655 B84-10127 06
PLATES (STRUCTURAL MEMBERS)
Data-Generating Program for ASKA Modeling
MSC-20644 B84-10134 06
Snapring Quick Fastener
NPO-15724 B84-10402 08
PLOTTERS
NASTRAN NASTPLT Plotting Post Processor
GSC-12833 B84-10215 09
PLOTTING
Root-Locus Algorithms
NPO-16154 B84-10221 09
PLUGGING
Tool for Inserting and Removing Tube Plugs
MFS-19871 B84-10364 07
PLUGS
Close-Out Plugs
MFS-19370 B84-10405 08
PNEUMATIC CONTROL
A Positive-Shutoff Fuel Valve
MFS-19779 B84-10145 06
POISSON RATIO
Acquisition of Dynamic Stress/Strain Data
MSC-20589 B84-10122 06
POLARITY
Detecting The Polarity Of Lightning Strikes
NPO-16063 B84-10247 01
POLISHING
Roof Polishing of Optical Fibers
LAR-13070 B84-10380 08
POLYNOMIALS
Predictive Smoothing-Convolution Algorithm
MSC-20604 B84-10419 09
POLYURETHANE FOAM
Polyurethane-Foam Maskant
MFS-19786 B84-10091 04
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
Polyurethane Masks Large Areas in Electroplating
MFS-19825 B84-10180 08
POROUS BOUNDARY LAYER CONTROL
Increasing the Ductility of Electroplated Metals
MFS-19873 B84-10304 04
POROUS PLATES
Pressure-Letdown Plates for Coal Gasifiers
NPO-15965 B84-10077 04
PORTABLE EQUIPMENT
Inert-Gas Electrical Discharge Machining
MFS-19778 B84-10162 07
Collapsible and Deployable Trusses
MFS-25945 B84-10177 08
PORTS (OPENINGS)
X-Band Strip-Line Power Divider/Combiner
NPO-16086 B84-10002 01
POSITION INDICATORS
Capture-Range Indicator
MFS-28008 B84-10354 06
POSITIONING DEVICES (MACHINERY)
Remotely Operated Gripper Tracks Applied Force
MSC-20241 B84-10159 07
POTENTIAL FLOW
Streaming-Potential Studies
MFS-25657 B84-10092 04
POWDER (PARTICLES)
Making Pure Fine-Grained Inorganic Powder
NPO-16398 B84-10086 04
POWER CONDITIONING
Advanced dc-Traction-Motor Control System
NPO-16118 B84-10229 01
POWER EFFICIENCY
Powerline Coupler for Windmill Motor/Generators
MFS-25944 B84-10010 01
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
POWER MODULES (STS)
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03
POWER SUPPLY CIRCUITS
Battery-Operated High-Voltage Power Supply
GSC-12818 B84-10001 01
Lightweight Regulated Power Supply
NPO-15977 B84-10236 01
Controlling Solar-Power Systems With Distributed Processors
NPO-15101 B84-10259 02
PRESSURE CHAMBERS
Beam Window for Pressure Chambers
MFS-25961 B84-10107 06
PRESSURE MEASUREMENT
Measuring Absolute Oxygen Pressure
NPO-16131 B84-10113 06
Gas-Density Gage
MFS-28011 B84-10353 06
PRESSURE REDUCTION
Pressure-Letdown Plates for Coal Gasifiers
NPO-15965 B84-10077 04
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07
PRESSURE REGULATORS
Conserving Purge Gases
MFS-19625 B84-10140 06
Inexpensive Pressure-Relief Valve
MSC-20518 B84-10155 07
Kick-Free Pressure Release Valve
NPO-16078 B84-10165 07
PRESSURE SENSORS
Low-Stress Sealing of Pressure Transducers
MFS-19877 B84-10114 06
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06
PRESTRESSING
Prestressed Thermal-Protection Panels
MSC-20254 B84-10382 08
PREWHIRLING
Prewhirl Jet Model
MFS-19826 B84-10136 06
PRIORITIES
Priority-Based Dispatching Algorithm
KSC-11277 B84-10218 09
PRISMS
Composite Spectrometer Prisms
NPO-16060 B84-10300 03
PROCUREMENT MANAGEMENT
Integrated Procurement Management System, Version II
MSC-20278 B84-10211 09
PRODUCTION COSTS
Price Estimation Guidelines
NPO-15569 B84-10186 08
PRODUCTION ENGINEERING
Production Line for Dendritic-Web Solar Cells
NPO-15098 B84-10172 08
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08
PRODUCTION MANAGEMENT
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08
PRODUCTION PLANNING
Front-End Program for SYSGEN
NPO-15782 B84-10036 02
PROFILOMETERS
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03
PROGRAM VERIFICATION (COMPUTERS)
Source Pre-Processor or Interface-Specification Language
NPO-15814 B84-10413 09
PROGRAMMED INSTRUCTION
Software for PROM Programing
MSC-20641 B84-10013 01
PROGRAMMING LANGUAGES
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
PROPELLERS
Over-the-Wing Propeller Reduces Wing Drag
LAR-13134 B84-10328 06
Propeller Design Program
LAR-13141 B84-10371 07
PROPULSION SYSTEM PERFORMANCE
Pump-Fed Versus Pressure-Fed Propulsion
NPO-15190 B84-10062 03
PROTECTIVE COATINGS
Lightning Protection for Composite Aircraft Structures
LAR-12879 B84-10120 06

PROXIMITY
Proximity Indicator for Remote Manipulator
NPO-15064 B84-10258 02
PUBLIC HEALTH
Estimating Health Services Requirements
NPO-14151 B84-10098 05
PULLING
Reactionless Winch
MSC-20440 B84-10362 07
PULSE GENERATORS
Light-Activated Microwave Device
NPO-16112 B84-10234 01
PULSE HEATING
Two-Pulse Stitch Welding
MFS-25716 B84-10188 08
PULSE POSITION MODULATION
Direct-Photon-Detection Communications
NPO-15905 B84-10256 02
PUMPS
High-Temperature Pump
NPO-15783 B84-10376 07
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
PURGING
Conserving Purge Gases
MFS-19625 B84-10140 06
Decontaminating Aluminum/Ammonia Heat Pipes
NPO-16066 B84-10179 08
PURIFICATION
Purification of Solar Ponds
NPO-15397 B84-10295 03
Degreaser Reduces Solvent Loss
NPO-16128 B84-10360 07
PYROLYSIS
Fluidized-Bed Reactor System
NPO-15975 B84-10087 04
Low-Temperature Extraction of Oil From Shale
NPO-15656 B84-10310 04
PYROTECHNICS
Burnwire Simulator
NPO-15883 B84-10021 01
Stepped-Pin Clevis Resists Jamming
NPO-15834 B84-10146 07

Q

QUALITY CONTROL
Capacitor-Test System
NPO-16485 B84-10038 02
QUANTUM EFFICIENCY
Assessing the Performance of Solar Arrays
NPO-15277 B84-10070 03
QUEUEING THEORY
Priority-Based Dispatching Algorithm
KSC-11277 B84-10218 09
Priority Queuing On A Parallel Data Bus
NPO-15005 B84-10261 02

R

RADAR IMAGERY
Estimating Doppler Shifts for Synthetic-Aperture Radar
NPO-15990 B84-10264 02
RADAR NAVIGATION
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02
RADAR TARGETS
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
RADIANT HEATING
Improved Ellipsoidal Radiation Furnace
MFS-25933 B84-10102 06
RADIATION
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
RADIATION DETECTORS
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
RADIATION DISTRIBUTION
Circularly-Polarized Microstrip Antenna
NPO-15875 B84-10009 01
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01
RADIATION LAWS
Thermal Radiation Analyzer
MSC-20448 B84-10133 06
RADIATION PROTECTION
Soft-X-Ray Prefilter for Hot, Bright Objects
NPO-15972 B84-10060 03
RADIO COMMUNICATION
Real-Time Reed-Solomon Decoder
NPO-15982 B84-10228 01
RADIO FREQUENCIES
Improved RF Isolation Amplifier
NPO-16026 B84-10011 01
RADIO FREQUENCY INTERFERENCE
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01
RANGE AND RANGE RATE TRACKING
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06
RANGE FINDERS
Angle-Measurement and Ranging System
MFS-25912 B84-10053 03
RATIOMETERS
Digital Ratiometer
NPO-15396 B84-10271 02
RAY TRACING
A General Optical Systems Evaluation Program
GSC-12823 B84-10057 03
REACTION TIME
Faster Response for Memory-Metal Actuators
NPO-16120 B84-10148 07
READERS
Managing Software Design and Design Changes
NPO-15331 B84-10416 09
RECEIVERS
Optical Quantum Receiver For Binary Signals
NPO-15122 B84-10030 02
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
RECOVERY PARACHUTES
Bridle Attachment for Aircraft Spin-Recovery Parachute
LAR-13076 B84-10357 07
Compact Antispin Parachute System
LAR-12979 B84-10358 07
REFLECTORS
Improved Ellipsoidal Radiation Furnace
MFS-25933 B84-10102 06
Efficient Reflector Antenna
NPO-16262 B84-10239 01
Acoustic Levitation System
NPO-16146 B84-10406 08
REGRESSION ANALYSIS
Retrieval of Geophysical Parameters From Radiometric Data
NPO-16266 B84-10286 03
REGULATORS
Zero-Net-Charge Air Ionizer
NPO-15937 B84-10054 03
REINFORCEMENT (STRUCTURES)
Alining Heat-Exchanger Tubes for Assembly
MFS-19857 B84-10182 08
Annular-Tube Reinforcer
MFS-19738 B84-10201 08
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06
RELEASING
Stepped-Pin Clevis Resists Jamming
NPO-15834 B84-10146 07
RELIABILITY ANALYSIS
Deriving Strain Modes From Vibrational Tests
MSC-20587 B84-10339 06
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
RELIEF VALVES
Inexpensive Pressure-Relief Valve
MSC-20518 B84-10155 07
Kick-Free Pressure Release Valve
NPO-16078 B84-10165 07
REMOTE HANDLING
Adjustable Mount
LAR-13100 B84-10352 06
Explosive Welding for Remote Applications
LAR-13119 B84-10397 08
REMOTE MANIPULATOR SYSTEM
Proximity Indicator for Remote Manipulator
NPO-15064 B84-10258 02
REMOTE SENSORS
General Design Considerations for Remote Sensors
NPO-15930 B84-10298 03
REMOVAL
Stripping the Sheath From Stranded Cables
NPO-15082 B84-10390 08
RENDEZVOUS GUIDANCE
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06
REPEATERS
Error Correction for Tandem Data-Transmission Paths
NPO-16125 B84-10417 09
REPORT GENERATORS
Generating Tables of Thermodynamic Properties
MSC-20701 B84-10130 06
RESEARCH MANAGEMENT
Research-Concept Evaluation
LAR-13143 B84-10206 09
RESOLUTION
Measuring Tracking Accuracy of CCD Imagers
NPO-15665 B84-10260 02

RESONANCE
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
RESONANCE TESTING
Tuning Concept for Resonant Cavities
NPO-15890 B84-10004 01
RIBBONS
Gas Atmospheres Improve Silicon-Ribbon Quality
NPO-15129 B84-10393 08
RING STRUCTURES
Support System for Solar Receivers
NPO-15749 B84-10072 03
Garter Valves
MFS-19899 B84-10359 07
Snapring Quick Fastener
NPO-15724 B84-10402 08
ROBOTS
Automatic Robot Safety Shutdown System
MFS-25969 B84-10368 07
ROLLING MOMENTS
Bridle Attachment for Aircraft Spin-Recovery Parachute
LAR-13076 B84-10357 07
ROOFS
Roof Overhangs for Solar Houses
LAR-13140 B84-10282 03
ROTATING SHAFTS
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07
ROTATION
Vacuum Seal Permits Limited Rotation
NPO-15115 B84-10150 07
ROTOR BLADES (TURBOMACHINERY)
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
RUBBER
Predicting Polymer/Liquide Interactions
NPO-14874 B84-10312 04

S

SAFETY DEVICES
Kick-Free Pressure Release Valve
NPO-16078 B84-10165 07
Guard For Fuse Caps
KSC-11283 B84-10243 01
Safety Pedal for Foot-Operated Machinery
MSC-20535 B84-10356 07
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07
Automatic Robot Safety Shutdown System
MFS-25969 B84-10368 07
SAMPLERS
Sorting Titanium Welding Rods
MSC-20588 B84-10383 08
SAMPLING
Fast Dual Analog-to-Digital Converter
NPO-15006 B84-10026 02
SANDWICH STRUCTURES
Strong, Lighweight Curved Panels
MSC-16278 B84-10399 08
SATELLITE TRANSMISSION
Retrieval of Geophysical Parameters From Radiometric Data
NPO-16266 B84-10286 03
SATURABLE REACTORS
Lightweight Regulated Power Supply
NPO-15977 B84-10236 01
SAWS
Reciprocating Saw for Silicon Wafers
NPO-15863 B84-10171 08
SCHEDULING
Language for Allocation and Network Scheduling
MSC-20633 B84-10212 09
SCRAPERS
Cleaning The Walls of A Silane Reactor
NPO-15851 B84-10318 04
SEALING
Differential Pressure Helps Seal Ball Valve
MSC-20615 B84-10330 06
SEALS (STOPPERS)
Low-Stress Sealing of Pressure Transducers
MFS-19877 B84-10114 06
Vacuum Seal Permits Limited Rotation
NPO-15115 B84-10150 07
Diverter Lip for Seal
MFS-19891 B84-10168 07
Tapered Ring Seal
LEW-10455 B84-10361 07
Close-Out Plugs
MFS-19370 B84-10405 08
SELECTORS
Selecting Flatpack Lead-Forming Dies
MFS-25951 B84-10141 06
SEMICONDUCTOR DEVICES
Light-Activated Microwave Device
NPO-16112 B84-10234 01
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08
SEMICONDUCTOR LASERS
Semiconductor Laser Phased Array
NPO-15963 B84-10006 01
Short-Range Digital Optical Links
NPO-15999 B84-10269 02
SEMICONDUCTORS (MATERIALS)
Upgrading Metallurgical-Grade Silicon
NPO-15076 B84-10074 04
SENSITIVITY
Calculating Closed-Loop Sensitivity to Parameter Variations
NPO-15941 B84-10202 09
SENSORY FEEDBACK
Remotely Operated Gripper Tracks Applied Force
MSC-20241 B84-10159 07
SEPARATORS
Molten-Salt Electrolysis
NPO-15535 B84-10320 04
SEQUENCING
Digital Sequence Controller
NPO-15725 B84-10012 01
Test Sequences for Reed-Solomon Encoders
NPO-15542 B84-10224 09
SERVICE LIFE
Sealing Mechanical Cryogenic Coolers
NPO-15139 B84-10149 07
SERVOMECHANISMS
Acoustic Position Servosystem
NPO-15936 B84-10407 08
SEWAGE TREATMENT
Aquatic Plants Aid Sewage Filter
MFS-25808 B84-10095 05
SHAFTS (MACHINE ELEMENTS)
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07
SHALE OIL
Low-Temperature Extraction of Oil From Shale
NPO-15656 B84-10310 04
SHELLS (STRUCTURAL FORMS)
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06
SHIELDING
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03
SHOCK ABSORBERS
Improved Coulomb-Friction Damper
MSC-20505 B84-10332 06
SHORT CIRCUITS
Direct-Current Unbalance Detector
NPO-15978 B84-10007 01
SHUTDOWNS
Automatic Robot Safety Shutdown System
MFS-25969 B84-10368 07
SIGNAL ANALYSIS
Calibrating for Ionospheric Phase Delays
NPO-15430 B84-10297 03
Predictive Smoothing-Convolution Algorithm
MSC-20604 B84-10419 09
SIGNAL GENERATORS
Temperature-Stabilized Phase Detector
NPO-15766 B84-10016 01
SIGNAL PROCESSING
Interactive Digital Signal Processor
GSC-12862 B84-10268 02
SIGNAL TO NOISE RATIOS
Estimates of Small Signal/Noise Ratios
NPO-15653 B84-10257 02
SILANES
Streaming-Potential Studies
MFS-25657 B84-10092 04
SILICON
Upgrading Metallurgical-Grade Silicon
NPO-15076 B84-10074 04
Reciprocating Saw for Silicon Wafers
NPO-15863 B84-10171 08
Production Line for Dendritic-Web Solar Cells
NPO-15098 B84-10172 08
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
Silicon-Web-Growing Machine
NPO-15870 B84-10193 08
Silicon Formation for Solar Cells
NPO-14973 B84-10313 04
Gas Atmospheres Improve Silicon-Ribbon Quality
NPO-15129 B84-10393 08
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08

SILICON CARBIDES
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08
SILICONE RUBBER
Silicone-Rubber Tooling for Hollow Panels
LAR-12974 B84-10346 06
SINGLE SIDEBAND TRANSMISSION
Improved Ultrasonic Resolution Via Analog Technique
NPO-15707 B84-10039 02
SINTERING
Sintered Lining for Heat-Pipe Evaporator
NPO-16172 B84-10118 06
Lightweight High-Temperature Thermal Insulation
MFS-19754 B84-10306 04
SIRENS
Acoustic Levitation System
NPO-16146 B84-10406 08
SLIDING FRICTION
Improved Coulomb-Friction Damper
MSC-20505 B84-10332 06
SLOPES
Determining The Slope Error Of A Parabolic Reflector
NPO-15713 B84-10280 03
SOL-GEL PROCESSES
Pure Glasses From Multicomponent Gels
NPO-16160 B84-10079 04
SOLAR ARRAYS
Stowable Solar-Cell Array
NPO-15893 B84-10020 01
Assessing the Performance of Solar Arrays
NPO-15277 B84-10070 03
Support System for Solar Receivers
NPO-15749 B84-10072 03
Testing for Solar-Array Hotspots
NPO-15596 B84-10073 03
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
Solar-Array Substrate From Glass-Reinforced Concrete
NPO-15077 B84-10385 08
Automated Solar-Panel Fabricator
NPO-16205 B84-10404 08
SOLAR CELLS
Production Line for Dendritic-Web Solar Cells
NPO-15098 B84-10172 08
Hot-Dipped Metal Films as Epitaxial Substrates
NPO-15904 B84-10178 08
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
Eutectic Contact Inks for Solar Cells
NPO-15171 B84-10305 04
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
SOLAR COLLECTORS
Evaluating Solar Collectors
NPO-15733 B84-10068 03
Solar-Power System Produces High-Pressure Steam
NPO-15434 B84-10288 03
Heat Storage and Transport
NPO-15468 B84-10291 03
A Ceramic Heat Exchanger for Solar Receivers
NPO-15771 B84-10296 03
SOLAR CONSTANT
Ten Thousand Solar Constants Radiometer
NPO-15922 B84-10290 03
SOLAR ENERGY
Solar-Powered Flywheel
MFS-25978 B84-10157 07
Fresnel-Lens/Heat-Storage System
NPO-16242 B84-10289 03
SOLAR ENERGY CONVERSION
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
SOLAR GENERATORS
Point-Focusing Solar-Power Distributed Receivers
NPO-15578 B84-10294 03
SOLAR HEATING
Solar-Powered Water Distillation
NPO-15894 B84-10069 03
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03
Solar-Heated Gasifier
NPO-15071 B84-10293 03
SOLAR HOUSES
Roof Overhangs for Solar Houses
LAR-13140 B84-10282 03
SOLAR OSCILLATIONS
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
SOLAR PONDS (HEAT STORAGE)
Purification of Solar Ponds
NPO-15397 B84-10295 03
SOLAR RADIATION
Point-Focusing Solar-Power Distributed Receivers
NPO-15578 B84-10294 03
SOLAR RADIATION SHIELDING
Solar Shutter
NPO-15428 B84-10292 03
SOLDERING
Solder Bonding for Power Transistors
MSC-20570 B84-10387 08
SOLID STATE DEVICES
High-Frequency, High-Power Capacitor
LEW-14034 B84-10225 01
Solid-State Latching Relay
NPO-15028 B84-10250 01
SOLIDIFICATION
Temperature-Gradient Furnace for Solidification Experiments
MFS-25963 B84-10101 06
Impurity Effects on Dendritic Growth
MFS-25672 B84-10197 08
SOLVENT RETENTION
Degreaser Reduces Solvent Loss
NPO-16128 B84-10360 07
SOUND GENERATORS
In-Place Calibration of Instrumentation Microphones
ARC-11463 B84-10349 06
SOURCE PROGRAMS
Source Pre-Processor or Interface-Specification Language
NPO-15814 B84-10413 09
SPACE COMMERCIALIZATION
Reciprocating Crystallizer
MFS-25948 B84-10196 08
Acoustic Position Servosystem
NPO-15936 B84-10407 08
SPACE PERCEPTION
Proximity Indicator for Remote Manipulator
NPO-15064 B84-10258 02
SPARK IGNITION
Improved Spark-Ignitor Circuitry
MFS-19751 B84-10019 01
SPARK MACHINING
Inert-Gas Electrical Discharge Machining
MFS-19778 B84-10162 07
EDM Electrode for Internal Grooves
MFS-19733 B84-10369 07
SPATIAL RESOLUTION
Improved Ultrasonic Resolution Via Analog Technique
NPO-15707 B84-10039 02
General Design Considerations for Remote Sensors
NPO-15930 B84-10298 03
SPECTRA
Monitoring of Reactive Atmospheric Species
NPO-15981 B84-10063 03
SPECTRAL RESOLUTION
General Design Considerations for Remote Sensors
NPO-15930 B84-10298 03
SPECTROMETERS
Precise Control of a Tunable IR Diode Laser
NPO-16000 B84-10023 01
Frequency-Modulation Correlation Spectrometer
NPO-15558 B84-10061 03
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03
Composite Spectrometer Prisms
NPO-16060 B84-10300 03
SPECTRORADIOMETERS
Ten Thousand Solar Constants Radiometer
NPO-15922 B84-10290 03
SPHERICAL SHELLS
Applying Uniform Polymer Coatings To Microspheres
NPO-16075 B84-10308 04
SPIN REDUCTION
Magnetic Despinning System
MFS-25966 B84-10166 07
Bridle Attachment for Aircraft Spin-Recovery Parachute
LAR-13076 B84-10357 07
Compact Antispin Parachute System
LAR-12979 B84-10358 07
SPIN STABILIZATION
Linear Boom Actuator
NPO-16099 B84-10374 07
SPLICING
Splicing Efficiently Couples Optical Fibers
NPO-16294 B84-10403 08
SPRAYED COATINGS
High-Temperature Coating for Titanium
NPO-16222 B84-10311 04
SPRAYING
Silicon Formation for Solar Cells
NPO-14973 B84-10313 04
STABILITY AUGMENTATION
Stable Optocoupler
MFS-25927 B84-10226 01
STANDARDIZATION
Eddy-Current Reference Standard
MFS-19824 B84-10138 06

STATIC ELECTRICITY
Measuring Air-Ionizer Output
NPO-16058 B84-10242 01
STATIC LOADS
Measuring Side Loads On Bolts
NPO-15705 B84-10137 06
STATISTICAL ANALYSIS
Multiple-User Adaptive-Array Communication System
NPO-15765 B84-10037 02
STATISTICAL CORRELATION
Estimating Health Services Requirements
NPO-14151 B84-10098 05
STEAM
Solar-Power System Produces High-Pressure Steam
NPO-15434 B84-10288 03
STEERABLE ANTENNAS
Synchronized Radar-Target Simulator
MSC-20240 B84-10263 02
STEERING
Semiconductor Laser Phased Array
NPO-15963 B84-10006 01
STEPPING MOTORS
Memory-Metal Stepping Motor
NPO-15482 B84-10167 07
Reducing Stepping-Motor Power Consumption
MFS-25119 B84-10246 01
STORAGE BATTERIES
Mathematical Storage-Battery Models
NPO-15615 B84-10018 01
STRANDS
Twist-Free Wire Stranding
MFS-25914 B84-10025 01
STRAPS
Clamp Secures Material to Cylinder Base
MFS-19479 B84-10158 07
STRESS ANALYSIS
Acquisition of Dynamic Stress/Strain Data
MSC-20589 B84-10122 06
Calculating Strain Relief in Electronic-Component Leads
MSC-20416 B84-10248 01
Deriving Strain Modes From Vibrational Tests
MSC-20587 B84-10339 06
STRESS RELIEVING
Calculating Strain Relief in Electronic-Component Leads
MSC-20416 B84-10248 01
STRESSED-SKIN STRUCTURES
Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
STRIP TRANSMISSION LINES
X-Band Strip-Line Power Divider/Combiner
NPO-16086 B84-10002 01
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08
STRUCTURAL ANALYSIS
Data-Generating Program for ASKA Modeling
MSC-20644 B84-10134 06
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04
STRUCTURAL DESIGN
More Efficient Structural Design by Optimality Criteria
NPO-15832 B84-10219 09
Roof Overhangs for Solar Houses
LAR-13140 B84-10282 03
STRUCTURAL DESIGN CRITERIA
Double Linear Damage Rule for Fatigue Analysis
LEW-14058 B84-10103 06
STRUCTURAL MEMBERS
Structural Turnbuckle Bears Compressive or Tensile Loads
MFS-25939 B84-10106 06
STRUCTURAL RELIABILITY
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04
STRUCTURAL STABILITY
Dynamic Simulation and Stability Analysis
GSC-12810 B84-10123 06
STRUCTURAL VIBRATION
Active Pulse Suppression of Structural Vibrations
NPO-15788 B84-10340 06
STRUCTURAL WEIGHT
Pump-Fed Versus Pressure-Fed Propulsion
NPO-15190 B84-10062 03
STRUTS
Synchronously Deployable Truss
LAR-13117 B84-10350 06
SUBREFLECTORS
Antenna Subreflector Fed by a Line Source
MSC-20626 B84-10237 01
SUBSONIC FLOW
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06
SUBSTRATES
Hot-Dipped Metal Films as Epitaxial Substrates
NPO-15904 B84-10178 08
Preparing InSb Substrates
NPO-16127 B84-10317 04
Solar-Array Substrate From Glass-Reinforced Concrete
NPO-15077 B84-10385 08
SUBSTRUCTURES
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06
SULFATES
Reciprocating Crystallizer
MFS-25948 B84-10196 08
SUPERSONIC NOZZLES
Two-Phase Wet/Dry Engine for Waste-Heat Recovery
NPO-15621 B84-10164 07
SUPPORTS
Isolation Mounting for Charge-Coupled Devices
NPO-15551 B84-10005 01
Flexible Mirror Mount for Michelson Interferometer
NPO-15746 B84-10066 03
Support System for Solar Receivers
NPO-15749 B84-10072 03
Pillar-Trimming System
NPO-15848 B84-10160 07
Adjustable Mount
LAR-13100 B84-10352 06
SURFACE ACOUSTIC WAVE DEVICES
Interferometer Measures Broardband Surface Acoustic Waves
LAR-12966 B84-10050 03
Interferometer for Measuring Acoustic Signals
LAR-13030 B84-10281 03
SURFACE CRACKS
Eddy-Current Inspection of Ball Bearings
MFS-25833 B84-10104 06
SURFACE NAVIGATION
Low-Frequency Navigational System
NPO-15264 B84-10045 02
SURFACE VEHICLES
Aerodynamic Design of Road Vehicles
NPO-15474 B84-10154 07
SURVEYS
Sting-Mounted Flow Survey Apparatus
LAR-13157 B84-10334 06
SWITCHES
Reversing Optical Damage In LiNbO3 Switches
NPO-16239 B84-10227 01
SWITCHING CIRCUITS
Reducing Stepping-Motor Power Consumption
MFS-25119 B84-10246 01
SYNCHRONIZERS
Digital Sequence Controller
NPO-15725 B84-10012 01
Power Train for Hybrid Electric Vehicle
NPO-15742 B84-10377 07
SYNTAX
Software Design Analyzer System
NPO-16234 B84-10210 09
SYNTHETIC APERTURE RADAR
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02
SYSTEMS ANALYSIS
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03
Fiber-Optic Equipment for Power-System Control
NPO-15968 B84-10266 02
SYSTEMS ENGINEERING
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
SYSTEMS SIMULATION
Front-End Program for SYSGEN
NPO-15782 B84-10036 02

T

TABLES (DATA)
Generating Tables of Thermodynamic Properties
MSC-20701 B84-10130 06
TARGET SIMULATORS
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
Synchronized Radar-Target Simulator
MSC-20240 B84-10263 02
TECHNOLOGY ASSESSMENT
Evaluating Solar Collectors
NPO-15733 B84-10068 03
Research-Concept Evaluation
LAR-13143 B84-10206 09

TELECOMMUNICATION
Intercomputer Communication Link
NPO-13446 B84-10029 02
Multiple-User Adaptive-Array Communication System
NPO-15765 B84-10037 02
TELEMETRY
Estimates of Small Signal/Noise Ratios
NPO-15653 B84-10257 02
Packet Telemetry and Packet Telecommand
NPO-16301 B84-10276 02
TEMPER (METALLURGY)
Solution Potentials Indicate Aluminum-Alloy Tempers
MFS-25846 B84-10081 04
TEMPERATURE CONTROL
Uniform-Temperature Walls for Cloud Chambers
MFS-25931 B84-10110 06
Maintaining Constant Load Cell Temperature
MSC-20333 B84-10143 06
Minimizing Convection During Crystal Growth
NPO-15811 B84-10194 08
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03
Solar Shutter
NPO-15428 B84-10292 03
TEMPERATURE GRADIENTS
Temperature-Gradient Furnace for Solidification Experiments
MFS-25963 B84-10101 06
Diverter Lip for Seal
MFS-19891 B84-10168 07
TEMPERATURE MEASUREMENT
Rapid Freezing-Point Measurement
LEW-14019 B84-10279 03
Brazing Alloys Indicate Turbomachinery Temperatures
MFS-19792 B84-10327 06
TEMPERATURE SENSORS
Detection of Gas Slugs in Heat Pipes
NPO-16064 B84-10144 06
Platinum-Resistor Differential Temperature Sensor
NPO-15666 B84-10252 01
TEST FACILITIES
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04
TEST FIRING
Burnwire Simulator
NPO-15883 B84-10021 01
TEST PATTERN GENERATORS
Test Sequences for Reed-Solomon Encoders
NPO-15542 B84-10224 09
TEST STANDS
Adjustable Mount
LAR-13100 B84-10352 06
TEXTURES
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
THERMAL ANALYSIS
Platinum-Resistor Differential Temperature Sensor
NPO-15666 B84-10252 01
THERMAL CONTROL COATINGS
High-Temperature Coating for Titanium
NPO-16222 B84-10311 04
THERMAL DIFFUSIVITY
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
THERMAL EXPANSION
Thermal-Expansion Measurement
MFS-27000 B84-10064 03
Properties of Low-Expansion Laminates
MFS-25859 B84-10082 04
Reducing Thermal Expansivity of Composite Panels
MFS-25793 B84-10117 06
Stabilized Aluminum Titanate
NPO-16227 B84-10319 04
THERMAL INSULATION
Sonically-Welded Thermal Blankets
MFS-25806 B84-10189 08
Lightweight High-Temperature Thermal Insulation
MFS-19754 B84-10306 04
Reusable Thermal Barrier for Insulation Gaps
MSC-20519 B84-10329 06
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
THERMAL PROTECTION
Data-Generating Program for ASKA Modeling
MSC-20644 B84-10134 06
Prestressed Thermal-Protection Panels
MSC-20254 B84-10382 08
THERMAL RADIATION
Thermal Radiation Analyzer
MSC-20448 B84-10133 06
THERMAL REACTORS
Fluidized-Bed Reactor System
NPO-15975 B84-10087 04
THERMAL RESISTANCE
Constant-Operating-Resistance Wire Probe
LAR-13144 B84-10341 06
Bonding Heat-Resistant Fabric to Tile
MSC-20540 B84-10396 08
THERMAL SIMULATION
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
Maintaining Constant Load Cell Temperature
MSC-20333 B84-10143 06
THERMAL STABILITY
Temperature-Stabilized Phase Detector
NPO-15766 B84-10016 01
Thermal Compensator for Paraboloidal Reflector
NPO-16145 B84-10301 03
THERMISTORS
Temperature Compensation for a Frequency-Modulated Oscillator
MSC-20556 B84-10249 01
THERMOCOUPLES
Tape-Mounted Thermocouple
NPO-16291 B84-10400 08
THERMODYNAMIC COUPLING
Matching Impedances and Modes in Acoustic Levitation
NPO-16022 B84-10184 08
THERMODYNAMIC EFFICIENCY
Two-Phase Wet/Dry Engine for Waste-Heat Recovery
NPO-15621 B84-10164 07
THERMODYNAMIC PROPERTIES
Generating Tables of Thermodynamic Properties
MSC-20701 B84-10130 06
THERMOELECTRIC GENERATORS
Thermoelectric Generator
NPO-16164 B84-10059 03
THICKNESS
Tube-Wall Thickness Detector
MFS-19741 B84-10024 01
THIN WALLS
Tube-Wall Thickness Detector
MFS-19741 B84-10024 01
THREE DIMENSIONAL FLOW
Computation of Three-Dimensional Combustor Performance
LEW-13930 B84-10129 06
THRESHOLD DETECTORS (DOSIMETERS)
Quicker Selection of CCD Images
NPO-15345 B84-10274 02
THRUST CHAMBERS
Structural Analysis of Cylindrical Thrust Chambers
LEW-13655 B84-10127 06
TILES
Bonding Heat-Resistant Fabric to Tile
MSC-20540 B84-10396 08
TIME SERIES ANALYSIS
Interactive Digital Signal Processor
GSC-12862 B84-10268 02
TITANATES
Stabilized Aluminum Titanate
NPO-16227 B84-10319 04
TITANIUM ALLOYS
Sorting Titanium Welding Rods
MSC-20588 B84-10383 08
TOOLING
Silicone-Rubber Tooling for Hollow Panels
LAR-12974 B84-10346 06
TOOLS
Magnetic Chuck for Precise Grinding
MFS-19764 B84-10191 08
Annular-Tube Reinforcer
MFS-19738 B84-10201 08
Measuring Clearance Indirectly
MFS-19875 B84-10355 06
Reactionless Winch
MSC-20440 B84-10362 07
Tool for Inserting and Removing Tube Plugs
MFS-19871 B84-10364 07
EDM Electrode for Internal Grooves
MFS-19733 B84-10369 07
TOPOGRAPHY
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02
TOWING
Compact Antispin Parachute System
LAR-12979 B84-10358 07
TOXIC HAZARDS
Desulfurization of Coal in Fluidized Beds
NPO-15924 B84-10303 04
TRACKING (POSITION)
Low-Frequency Navigational System
NPO-15264 B84-10045 02
Measuring Tracking Accuracy of CCD Imagers
NPO-15665 B84-10260 02

TRAJECTORY ANALYSIS
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
TRANSDUCERS
Direct-Current Unbalance Detector
NPO-15978 B84-10007 01
Transducers For Heat Research
NPO-15095 B84-10094 05
Pulsed-Current Transducers
NPO-14048 B84-10251 01
Multipurpose Photonic Transducers
NPO-15135 B84-10338 06
Fabricating Underwater Electroacoustic Transducers
LAR-13007 B84-10381 08
TRANSFER FUNCTIONS
Transfer-Function Simulator
NPO-15696 B84-10046 02
TRANSIENT RESPONSE
Transient Response Analysis
MSC-20590 B84-10135 06
TRANSMISSION
Remote-Imaging Parameters
NPO-14869 B84-10041 02
TRANSMISSION LOSS
Error Correction for Tandem Data-Transmission Paths
NPO-16125 B84-10417 09
TRANSMISSIONS (MACHINE ELEMENTS)
Hybrid-Vehicle Transmission System
NPO-16119 B84-10372 07
TRANSPORT PROPERTIES
Parameters Affecting Electrophoresis
MFS-25593 B84-10099 05
TRUSSES
Collapsible and Deployable Trusses
MFS-25945 B84-10177 08
Synchronously Deployable Truss
LAR-13117 B84-10350 06
Deployable Geodesic Truss
LAR-13113 B84-10351 06
TUBE HEAT EXCHANGERS
Alining Heat-Exchanger Tubes for Assembly
MFS-19857 B84-10182 08
High-Temperature Pump
NPO-15783 B84-10376 07
TUNABLE LASERS
Precise Control of a Tunable IR Diode Laser
NPO-16000 B84-10023 01
TUNING
Tuning Concept for Resonant Cavities
NPO-15890 B84-10004 01
TURBINES
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
TURBULENCE
Turbulent Recirculating Flows in Isothermal Combustor Geometries
LEW-13894 B84-10128 06
TYPEWRITERS
Improved Optical Keyboard
NPO-15132 B84-10254 01

U

ULTRASONIC WAVE TRANSDUCERS
Acoustic Gaussian Far-Field Pattern
LAR-12967 B84-10051 03
ULTRASONIC WELDING
Sonically-Welded Thermal Blankets
MFS-25806 B84-10189 08
ULTRASONICS
Improved Ultrasonic Resolution Via Analog Technique
NPO-15707 B84-10039 02
UMBILICAL CONNECTORS
Remote Coupling of Electrical Connectors
MSC-20414 B84-10363 07
UNDERWATER ACOUSTICS
Fabricating Underwater Electroacoustic Transducers
LAR-13007 B84-10381 08
UPGRADING
Upgrading Metallurgical-Grade Silicon
NPO-15076 B84-10074 04

V

VACUUM CHAMBERS
Vacuum Seal Permits Limited Rotation
NPO-15115 B84-10150 07
VACUUM TESTS
High-Frequency, High-Power Capacitor
LEW-14034 B84-10225 01
VALVES
Differential Pressure Helps Seal Ball Valve
MSC-20615 B84-10330 06
Garter Valves
MFS-19899 B84-10359 07
VAPOR DEPOSITION
Gravitational Effects on Crystal Growth by Vapor Transport
NPO-15853 B84-10391 08
VAPORIZERS
Heat-Exchanger Computational Procedure For Temperature-Dependent Fouling
LEW-13874 B84-10126 06
Degreaser Reduces Solvent Loss
NPO-16128 B84-10360 07
VIBRATION ISOLATORS
Isolation Mounting for Charge-Coupled Devices
NPO-15551 B84-10005 01
Active Pulse Suppression of Structural Vibrations
NPO-15788 B84-10340 06
VIBRATION MODE
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
VIBRATIONAL STRESS
Deriving Strain Modes From Vibrational Tests
MSC-20587 B84-10339 06
VIDEO COMMUNICATION
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02
VIEWING
Beam Window for Pressure Chambers
MFS-25961 B84-10107 06
Imaging System For High-Temperature Processes
NPO-15945 B84-10273 02
VISCOSITY
Equation for Electrolyte Viscosity
NPO-15096 B84-10076 04
VOLTAGE CONVERTERS (DC TO DC)
Automatic Monitoring of Switching Power Supplies
MFS-25968 B84-10028 02
VOLTAGE REGULATORS
LRU Voltage Analysis
MSC-20699 B84-10035 02
Lightweight Regulated Power Supply
NPO-15977 B84-10236 01
VOLTMETERS
Circuit for Monitoring Cell Voltages
MFS-25924 B84-10008 01

W

WAFERS
Reciprocating Saw for Silicon Wafers
NPO-15863 B84-10171 08
Automatically Dressing Blades in Silicon-Wafer Cutting
NPO-15745 B84-10174 08
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08
WARPAGE
Thermal-Balance Strip for Fluted LFC Panels
LAR-12991 B84-10345 06
WASHERS (SPACERS)
Low-Stress Sealing of Pressure Transducers
MFS-19877 B84-10114 06
WATER TREATMENT
Solar-Powered Water Distillation
NPO-15894 B84-10069 03
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03
WAVE DISPERSION
Composite Spectrometer Prisms
NPO-16060 B84-10300 03
WAVEFORMS
Automatic Monitoring of Switching Power Supplies
MFS-25968 B84-10028 02
Interferometer Measures Broadband Surface Acoustic Waves
LAR-12966 B84-10050 03
Antenna Subreflector Fed by a Line Source
MSC-20626 B84-10237 01
WEAR
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07
WEATHER
Predicting Severe Duststorms
NPO-14999 B84-10411 09
WEBS (SHEETS)
Silicon-Web-Growing Machine
NPO-15870 B84-10193 08
WEIGHT MEASUREMENT
Maintaining Constant Load Cell Temperature
MSC-20333 B84-10143 06
WEIGHTING FUNCTIONS
Multiple-User Adaptive-Array Communication System
NPO-15765 B84-10037 02

WELD STRENGTH
Explosive Welding for Remote Applications
LAR-13119 B84-10397 08

WELD TESTS
Sorting Titanium Welding Rods
MSC-20588 B84-10383 08

WELDED JOINTS
X-Ray Determination of Weld Misalinement
MSC-20418 B84-10323 06

WELDING
Two-Pulse Stitch Welding
MFS-25716 B84-10188 08

Sonically-Welded Thermal Blankets
MFS-25806 B84-10189 08

Welding Many Thin Metal Layers
MSC-20698 B84-10398 08

WINCHES
Reactionless Winch
MSC-20440 B84-10362 07

WIND EFFECTS
The Effect of Wind on the Aerodynamic Resistance of Highway Vehicles
NPO-14771 B84-10152 07

Over-the-Wing Propeller Reduces Wing Drag
LAR-13134 B84-10328 06

WIND TUNNEL APPARATUS
Sting-Mounted Flow Survey Apparatus
LAR-13157 B84-10334 06

WIND TUNNEL TESTS
Surface-Streamline Flow Visualization
LEW-13875 B84-10105 06

WINDING
Twist-Free Wire Stranding
MFS-25914 B84-10025 01

WINDMILLS (WINDPOWERED MACHINES)
Powerline Coupler for Windmill Motor/Generators
MFS-25944 B84-10010 01

WINDOWS (APERTURES)
Beam Window for Pressure Chambers
MFS-25961 B84-10107 06

WING FLAPS
Aerodynamic Analysis of Low-Speed Wing-Flap Systems
LAR-13116 B84-10124 06

WING LOADING
Over-the-Wing Propeller Reduces Wing Drag
LAR-13134 B84-10328 06

WING PANELS
Silicone-Rubber Tooling for Hollow Panels
LAR-12974 B84-10346 06

WIRE WINDING
Twist-Free Wire Stranding
MFS-25914 B84-10025 01

WIRING
Wire-Identification Instrument
NPO-15633 B84-10027 02

WORD PROCESSING
A Visually Oriented Text Editor
NPO-15088 B84-10213 09

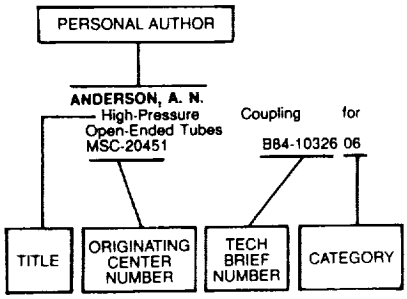
X

X RAY FLUORESCENCE
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06

X RAY IMAGERY
Soft-X-Ray Prefilter for Hot, Bright Objects
NPO-15972 B84-10060 03

X RAY INSPECTION
X-Ray Determination of Weld Misalinement
MSC-20418 B84-10323 06

Typical Personal Author Index Listing



This index is arranged alphabetically by author. The Tech Brief title is listed followed by the originating Center number, e.g., MSC-20451. The Tech Brief number, e.g., B84-10326, is followed by a two-digit number, e.g., 06, which designates the subject category.

A

ABBOTT, R.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04

ADAMS, T.
Close-Out Plugs
MFS-19370 B84-10405 08

AGGARWAL, M.
Reciprocating Crystallizer
MFS-25948 B84-10196 08

AJELLO, J. M.
Electron-Attachment Profiles
NPO-14865 B84-10299 03

AKUTAGAWA, W. M.
Gravitational Effects on Crystal Growth by Vapor Transport
NPO-15853 B84-10391 08

ALDERSON, D. J.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

ALDRICH, B. R.
Temperature-Gradient Furnace for Solidification Experiments
MFS-25963 B84-10101 06

ALEXANDER, H. M.
Estimating Health Services Requirements
NPO-14151 B84-10098 05

ALLEN SR., J. H.
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06

ALVAREZ, J. C.
Predictive Smoothing-Convolution Algorithm
MSC-20604 B84-10419 09

AMBROSE JR., H. H.
Eddy-Current Reference Standard
MFS-19824 B84-10138 06

ANDERSON, A. N.
High-Pressure Coupling for Open-Ended Tubes
MSC-20451 B84-10326 06

ANDERSON, C. R.
Normalizing VFO Frequency by Non-Powr-of-2 Division
NPO-15330 B84-10049 02

ANDERSON, R.
Integrated Exhaust-Gas-Analysis System
LEW-14062 B84-10337 06

ANDRADE, J.
Streaming-Potential Studies
MFS-25657 B84-10092 04

ANDREWS, T. W.
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03

Probe Follower for Moving Blood Vessels
NPO-15898 B84-10321 05

ARGOUD, M.
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03

ARMSTRONG, W.
Structural Analysis of Cylindrical Thrust Chambers
LEW-13655 B84-10127 06

ARNETT, J. C.
Testing for Solar-Array Hotspots
NPO-15596 B84-10073 03

ASHBY JR., G. C.
Sting-Mounted Flow Survey Apparatus
LAR-13157 B84-10334 06

ASTER, R. W.
Price Estimation Guidelines
NPO-15569 B84-10186 08

ASTON, M.
Mathematical Storage-Battery Models
NPO-15615 B84-10018 01

ATWELL, D. C.
Guard For Fuse Caps
KSC-11283 B84-10243 01

AUSTIN JR., J. G.
Beam Window for Pressure Chambers
MFS-25961 B84-10107 06

AUYEUNG, J.
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03

AVERY, D. E.
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06

AWAYA, H. I.
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03

B

BAHRAMI, P. A.
Heat Storage and Transport
NPO-15468 B84-10291 03

BAILY, R. D.
Tube-Wall Thickness Detector
MFS-19741 B84-10024 01

BALLARD, G. K.
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06

BANKSTON, B.
Eddy-Current Inspection of Ball Bearings
MFS-25833 B84-10104 06

BARBOUR, R. T.
Remote Coupling of Electrical Connectors
MSC-20414 B84-10363 07

BARMATZ, M. B.
Matching Impedances and Modes in Acoustic Levitation
NPO-16022 B84-10184 08

BARNES, A.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04

BARNS, C. E.
Fluorescent Gage Indication
ARC-11397 B84-10384 08

BASNETT, C. B.
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06

BATEMAN, W. A.
Structural Turnbuckle Bears Compressive or Tensile Loads
MFS-25939 B84-10106 06

BATHKER, D. A.
Efficient Reflector Antenna
NPO-16262 B84-10239 01

BAUER JR., J. L.
Glass/Epoxy Door Panel for Automobiles
NPO-15057 B84-10389 08

BAUM, B.
Elastomer Encapsulant for Solar-Cell Arrays
NPO-15663 B84-10083 04

BEASLEY, J. L.
Polyurethane Masks Large Areas in Electroplating
MFS-19825 B84-10180 08

BEATTY, R.
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07

BEEKMAN, D. H.
Measuring the Liquid Content of a Gas
MFS-25990 B84-10343 06

BEER, R.
Digital Ratiometer
NPO-15396 B84-10271 02

AUTHOR

BEJCZY, A. K.
Proximity Indicator for Remote Manipulator
NPO-15064 B84-10258 02
BELL SR., N.
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
BEMENT, L. J.
Explosive Welding for Remote Applications
LAR-13119 B84-10397 08
BENSON, K. A.
Alining Heat-Exchanger Tubes for Assembly
MFS-19857 B84-10182 08
BERNSTERIN, W.
Gas-Density Gage
MFS-28011 B84-10353 06
BERRY, V.
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06
BESTOR, H. L.
Strong, Lighweight Curved Panels
MSC-16278 B84-10399 08
BETTINI, R.
Sonically-Welded Thermal Blankets
MFS-25806 B84-10189 08
BICKLER, T. C.
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
BIENERT, W. B.
Flexible Heat Pipe
GSC-12864 B84-10109 06
BILLINGSLEY, F. C.
General Design Considerations for Remote Sensors
NPO-15930 B84-10298 03
BILLITTI, J. W.
Computerized Interactive Harness Engineering
NPO-16272 B84-10014 01
BLACK, G.
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
BLACKMAN, L. D.
Transient Response Analysis
MSC-20590 B84-10135 06
BLEWETT, L.
Conserving Purge Gases
MFS-19625 B84-10140 06
BODEMEIJER, R.
Polyurethane-Foam Maskant
MFS-19786 B84-10091 04
BOISVERT, R.
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03
BONO, P.
Thermal-Balance Strip for Fluted LFC Panels
LAR-12991 B84-10345 06
BORDEN, C. S.
Cost and Performance of Distributed Photovoltaic Systems
NPO-16001 B84-10033 02
BOSWELL, B. E.
Reactionless Winch
MSC-20440 B84-10362 07
BOWYER, J. M.
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03
BOYLE, M.
Surface-Streamline Flow Visualization
LEW-13875 B84-10105 06
BRADY, F. H.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
BRANSFORD, J. W.
Beam Window for Pressure Chambers
MFS-25961 B84-10107 06
BRAY, S. C.
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07
BRECKHELMER, P. J.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
BRECKINRIDGE, J. B.
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03
Composite Spectrometer Prisms
NPO-16060 B84-10300 03
BRENNAND, J. P.
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02
BRIDGEFORTH, A. O.
Fiber-Optic Equipment for Power-System Control
NPO-15968 B84-10266 02
BRITCLIFFE, M. J.
Platinum-Resistor Differential Temperature Sensor
NPO-15666 B84-10252 01
BROWN JR., A. C.
Antenna Subreflector Fed by a Line Source
MSC-20626 B84-10237 01
BROWN, H.
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
BROWN, R. L.
Sorting Titanium Welding Rods
MSC-20588 B84-10383 08
BRUNNER, G. D.
Antenna Subreflector Fed by a Line Source
MSC-20626 B84-10237 01
BRYANT, J. A.
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07
BUCKLEY, D.
Differential-Coil Eddy-Current Material Sorter
MFS-19872 B84-10231 01
BUCKLEY, J. D.
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
BUMMER, G. L.
Burnwire Simulator
NPO-15883 B84-10021 01
BURGER, D. R.
Measuring The Contact Resistances Of Photovoltaic Cells
NPO-16168 B84-10240 01
BURKAVAGE, J.
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09
BURNS, G. C.
Remotely Operated Gripper Tracks Applied Force
MSC-20241 B84-10159 07
BUSH, H. G.
Synchronously Deployable Truss
LAR-13117 B84-10350 06
BUTLER, L. V.
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03

C

CALLENDER, D. E.
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
CALLENDER, E. D.
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
CAMPBELL, G. E.
Improved Coulomb-Friction Damper
MSC-20505 B84-10332 06
CANTRELL JR., J. H.
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06
CARAS, P.
Welding Many Thin Metal Layers
MSC-20698 B84-10398 08
CARDEN, H. D.
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06
CARLEY, W. J.
Evaluating Solar Collectors
NPO-15733 B84-10068 03
CARLSON, C. R.
Front-End Program for SYSGEN
NPO-15782 B84-10036 02
CARLSON, H. W.
Aerodynamic Analysis of Low-Speed Wing-Flap Systems
LAR-13116 B84-10124 06
CARO, E. R.
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02
CARPENTER, S.
Purification of Solar Ponds
NPO-15397 B84-10295 03
CARSON, L. M.
Discriminator Aids Phase-Lock Acquisition
NPO-14311 B84-10233 01
CARTER, B.
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
CARVER, R. A.
Magnetic Chuck for Precise Grinding
MFS-19764 B84-10191 08
CASSIDENTI, M. L.
Inert-Gas Electrical Discharge Machining
MFS-19778 B84-10162 07
CHA, A. G.
Efficient Reflector Antenna
NPO-16262 B84-10239 01
CHAMBERLAIN, R. G.
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03

Price Estimation Guidelines
NPO-15569 B84-10186 08
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08

CHANG, C.
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04

CHAPMAN, C. P.
Mathematical Storage-Battery Models
NPO-15615 B84-10018 01
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02

CHENG, T. K.
Data-Generating Program for ASKA Modeling
MSC-20644 B84-10134 06

CHIAPPETTA, L.
Heat-Exchanger Computational Procedure For Temperature-Dependent Fouling
LEW-13874 B84-10126 06

CHIN, B. C.
Synchronized Radar-Target Simulator
MSC-20240 B84-10263 02

CHITRE, S.
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08

CHOATE, E. L.
Selecting Flatpack Lead-Forming Dies
MFS-25951 B84-10141 06

CHRIST, G. R.
Determining The Slope Error Of A Parabolic Reflector
NPO-15713 B84-10280 03

CHRISTNER, B. K.
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04

CHUTJIAN, A.
Electron-Attachment Profiles
NPO-14865 B84-10299 03

CITRIN, F.
Sonically-Welded Thermal Blankets
MFS-25806 B84-10189 08

CLANTON, U. S.
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06

CLARY, M. C.
High-Resolution vice Camera
NPO-15086 B84-10275 02

CLAUS, R. O.
Interferometer Measures Broadband Surface Acoustic Waves
LAR-12966 B84-10050 03
Acoustic Gaussian Far-Field Pattern
LAR-12967 B84-10051 03
Interferometer for Measuring Acoustic Signals
LAR-13030 B84-10281 03

CLAUSE, R. O.
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06

COHN, R.
Quick-Change Holder for Aeronautical-Research Microphones
FRC-11072 B84-10347 06

COHN, R. B.
In-Place Calibration of Instrumentation Microphones
ARC-11463 B84-10349 06

COLE, T.
Thermoelectric Generator
NPO-16164 B84-10059 03

COLEMAN, A. D.
Insulation Debond Detection
MFS-25862 B84-10324 06

COLLIER, J. B.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

COLLIER, L. J.
Integrated Procurement Management System, Version II
MSC-20278 B84-10211 09

COLLINS JR., E. R.
Pressure-Letdown Plates for Coal Gasifiers
NPO-15965 B84-10077 04
Coal-Face Fracture With A Two-Phase Liquid
NPO-15849 B84-10090 04
Flexible Liquid-Transport Tube
NPO-15761 B84-10139 06
Automatic Coal-Mining System
NPO-15861 B84-10151 07
Pillar-Trimming System
NPO-15848 B84-10160 07
Reciprocating Saw for Silicon Wafers
NPO-15863 B84-10171 08

COLWELL, R.
Monitoring Marine Microbial Fouling
MFS-25928 B84-10096 05

COMFORT, D. L.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09

COMPTON, L. E.
Low-Temperature Extraction of Oil From Shale
NPO-15656 B84-10310 04

CONNER, R. J.
Thermal Radiation Analyzer
MSC-20448 B84-10133 06

CONOVER, R. A.
Batteries for Electric Vehicles
NPO-15142 B84-10244 01

CONROY, B. L.
X-Band Strip-Line Power Divider/Combiner
NPO-16086 B84-10002 01

CORIELL, S.
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03

CRAMER, P. W.
Ellipsoidal Balloon Antenna
NPO-15931 B84-10238 01

CRICKARD, P.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04

CRONKHITE, J.
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06

CROONQUIST, A.
Acoustic Levitation System
NPO-16146 B84-10406 08

CROSSLEY, E. A.
Adjustable Mount
LAR-13100 B84-10352 06

CUBICCIOTTI, D.
Molten-Salt Electrolysis
NPO-15535 B84-10320 04

CULLER, V. H.
Transducers For Heat Research
NPO-15095 B84-10094 05

CURLANDER, J. C.
Estimating Doppler Shifts for Synthetic-Aperture Radar
NPO-15990 B84-10264 02

CUSHMAN, J. B.
Efficient Joints for Graphite/Epoxy Structures
LAR-13091 B84-10121 06

D

DANDAGE, S.
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03

DANFORD, M. D.
Solution Potentials Indicate Aluminum-Alloy Tempers
MFS-25846 B84-10081 04

DAS, D.
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04

DAVIS, J. H.
Thermal-Expansion Measurement
MFS-27000 B84-10064 03

DAVIS, J. M.
Soft-X-Ray Prefilter for Hot, Bright Objects
NPO-15972 B84-10060 03

DAVIS, P. A.
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06

DAVIS, W. T.
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06

DAVISSON, M.
Front-End Program for SYSGEN
NPO-15782 B84-10036 02

DAVISSON, M. C.
Cost and Performance of Distributed Photovoltaic Systems
NPO-16001 B84-10033 02
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03

DAYMAN JR., B.
The Effect of Wind on the Aerodynamic Resistance of Highway Vehicles
NPO-14771 B84-10152 07

DEMONET, R. J.
Acquisition of Dynamic Stress/Strain Data
MSC-20589 B84-10122 06

DENNIS, G. B.
Square-Cutting Grinder
KSC-11257 B84-10199 08

DENNISON, E. W.
Measuring Tracking Accuracy of CCD Imagers
NPO-15665 B84-10260 02

DENSON, M. A.
Algorithm Solves Constrained and Unconstrained Optimization Problems
MSC-20683 B84-10216 09

DEUTSCH, L. J.
Reed-Solomon Encoder
NPO-16074 B84-10048 02
DHOLAKIA, A. R.
Roof Polishing of Optical Fibers
LAR-13070 B84-10380 08
DICKINSON, R. M.
Integrated Laser and Light Detector
NPO-15943 B84-10230 01
Magic-T-Coupled Magnetrons
NPO-15061 B84-10235 01
Short-Range Digital Optical Links
NPO-15999 B84-10269 02
DIETZ, P. W.
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07
DINLEY, L. A.
Coilable-Column Development
MFS-27032 B84-10142 06
DIVSALAR, D.
Convolutionally-Coded Unbalanced QPSK Systems
NPO-15566 B84-10267 02
DOMINIK, D. F.
Flight-Stability Extremes Calculated From the Uncertainty Ellipse
MSC-20308 B84-10409 09
DONOVAN, J.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04
DOTTI, G.
Hybrid-Vehicle Transmission System
NPO-16119 B84-10372 07
DOWLER, W. L.
Optical Logic Gates
NPO-15134 B84-10003 01
Multipurpose Photonic Transducers
NPO-15135 B84-10338 06
DU FRESNE, E. R.
Optical Logic Gates
NPO-15134 B84-10003 01
Multipurpose Photonic Transducers
NPO-15135 B84-10338 06
Degreaser Reduces Solvent Loss
NPO-16128 B84-10360 07
DUCA, J.
Setup Aid for Electrical-Discharge Machining
MFS-19874 B84-10370 07
DUNCAN, C.
Silicon-Web-Growing Machine
NPO-15870 B84-10193 08
DUNN, T. J.
Prestressed Thermal-Protection Panels
MSC-20254 B84-10382 08

E

EASTMAN, G. Y.
Sintered Lining for Heat-Pipe Evaporator
NPO-16172 B84-10118 06
EDWARDS, T. R.
Fast Two-Dimensional Digital-Filter Hardware
MFS-25876 B84-10204 09
EIRLS, J. L.
Solar-Array Substrate From Glass-Reinforced Concrete
NPO-15077 B84-10385 08
EKELUND, J. E.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
EL GABALAWI, N.
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
ELACHI, C.
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02
ELDER, R. J.
Solar-Powered Water Distillation
NPO-15894 B84-10069 03
ELLEMAN, D. D.
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
ELLIOTT, D. G.
Two-Phase Wet/Dry Engine for Waste-Heat Recovery
NPO-15621 B84-10164 07
ELLIS, J.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
ERICKSON, W. J.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
ERNST, D. M.
Sintered Lining for Heat-Pipe Evaporator
NPO-16172 B84-10118 06
ERWIN, L.
Vented Compression Molding of Granule-Filled Resins
MFS-25975 B84-10181 08
ESTES, R.
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09
ESTEY, P. N.
Pump-Fed Versus Pressure-Fed Propulsion
NPO-15190 B84-10062 03
ESTRELLA, C.
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
ETHRIDGE, E. C.
Containerless Manufacture of Glass Optical Fibers
MFS-25905 B84-10075 04
Improved Ellipsoidal Radiation Furnace
MFS-25933 B84-10102 06

F

FASHEH, J. I.
Lightweight High-Temperature Thermal Insulation
MFS-19754 B84-10306 04
FEDORS, R. F.
Equation for Electrolyte Viscosity
NPO-15096 B84-10076 04
Reducing Liquid Permeation Through Polymer Sheets
NPO-15802 B84-10089 04
Predicting Polymer/Liquide Interactions
NPO-14874 B84-10312 04
FELDSTEIN, C.
Transducers For Heat Research
NPO-15095 B84-10094 05
FELSENTREGER, T.
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09
FENWICK, J.
Measuring the Runout on a Rotary Shaft
MFS-19694 B84-10169 07
FERGUSON, R. L.
Fabricating Underwater Electroacoustic Transducers
LAR-13007 B84-10381 08
FERRALL, J. F.
Integrated Fuel Cell/Coal Gasifier
NPO-16062 B84-10314 04
FIEGL, G.
Two-Crucible Czochralski Process
NPO-15110 B84-10170 08
FIRNETT, P. J.
Price Estimation Guidelines
NPO-15569 B84-10186 08
Assembly-Line Manufacturing Industry Simulation
NPO-16032 B84-10187 08
FISHER, T. T.
Holding Cargo in Place With Foam
MSC-20723 B84-10367 07
FLEISCHMAN, G.
Uniform-Temperature Walls for Cloud Chambers
MFS-25931 B84-10110 06
FLEMING, D. P.
Tapered Ring Seal
LEW-10455 B84-10361 07
FLYNN, J. A.
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
FOX, R. L.
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
FRAZER, R. E.
Probe Follower for Moving Blood Vessels
NPO-15898 B84-10321 05
FRICKLAND, P. O.
Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
FRIPP JR., A.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
FRISCH, H. P.
Dynamic Simulation and Stability Analysis
GSC-12810 B84-10123 06
FROST, R.
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04
FUJITA, T.
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03

G

GALINDO, V.
Efficient Reflector Antenna
NPO-16262 B84-10239 01
GALLARDO JR., V.
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06

GALLIMORE, F. H.
Silicone-Rubber Tooling for Hollow Panels
LAR-12974 B84-10346 06
GAMMELL, P. M.
Improved Ultrasonic Resolution Via Analog Technique
NPO-15707 B84-10039 02
Acoustic Levitation System
NPO-16146 B84-10406 08
GARCIA, G. D.
Safety Pedal for Foot-Operated Machinery
MSC-20535 B84-10356 07
GARG, A. O.
Interferometer for Measuring Acoustic Signals
LAR-13030 B84-10281 03
GARVIN, H. L.
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08
GEE, C. M.
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08
Reversing Optical Damage In LiNbO3 Switches
NPO-16239 B84-10227 01
GERGIS, I.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
GILBAUGH, B. L.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
GIN, B.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
GLAVICH, T. A.
Imaging System For High-Temperature Processes
NPO-15945 B84-10273 02
GLICKSMAN, M.
Convective Oscillations at Crystal/Melt Interface
MFS-25892 B84-10055 03
GLICKSMAN, M. E.
Impurity Effects on Dendritic Growth
MFS-25672 B84-10197 08
GOBLE, R. G.
Thermal Radiation Analyzer
MSC-20448 B84-10133 06
GOLDSTEIN, H. E.
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
GOLDSTEIN, R.
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08
GOLDSTEIN, R. M.
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02
GOMEZ, J. E.
A Visually Oriented Text Editor
NPO-15088 B84-10213 09
GONZALEZ, C. C.
Assessing the Performance of Solar Arrays
NPO-15277 B84-10070 03
Testing for Solar-Array Hotspots
NPO-15596 B84-10073 03
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
GOOLSBY, C. W.
Software for PROM Programing
MSC-20641 B84-10013 01
GOSS, W. C.
Isolation Mounting for Charge-Coupled Devices
NPO-15551 B84-10005 01
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08
GOSS, W. G.
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03
GRACEY, W.
Roof Overhangs for Solar Houses
LAR-13140 B84-10282 03
GRANT, W. B.
Laser Pollutant-Measuring Systems
NPO-16101 B84-10285 03
GRAY, F. P.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
GREEN, G. L.
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
GREEN, R. R.
Fast Dual Analog-to-Digital Converter
NPO-15006 B84-10026 02
GREENBERG, E.
Packet Telemetry and Packet Telecommand
NPO-16301 B84-10276 02
GREENHALL, C. A.
Removing Drift From Frequency-Stability Measurements
NPO-15833 B84-10040 02
GREGONIS, D.
Streaming-Potential Studies
MFS-25657 B84-10092 04
GRIFFIN, D. J.
Stable Optocoupler
MFS-25927 B84-10226 01
GRIFFITH, J. S.
Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
GRUMM, R. L.
Detecting The Polarity Of Lightning Strikes
NPO-16063 B84-10247 01
GRUNTHANER, F. J.
Preparing InSb Substrates
NPO-16127 B84-10317 04
GUIAR, C. N.
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01

H

HAGERTY, J. J.
Automated Solar-Panel Fabricator
NPO-16205 B84-10404 08
HALE, R. R.
Solar Shutter
NPO-15428 B84-10292 03
High-Temperature Pump
NPO-15783 B84-10376 07
HALFORD, G.
Double Linear Damage Rule for Fatigue Analysis
LEW-14058 B84-10103 06
HAMBROCK, K. O.
Bolt Inserts for Lightning Protection
MFS-25918 B84-10156 07
HANSON, J. A.
Experimental Ecosystems Sealed in Glass
NPO-15712 B84-10097 05
HARADA, Y.
High-Temperature Coating for Titanium
NPO-16222 B84-10311 04
HARTSOUGH, C.
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
HARTWELL, B. O.
Welding Many Thin Metal Layers
MSC-20698 B84-10398 08
HASEGAWA, T.
Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
HAYDUK, R. J.
Energy-Absorbing Airframes for General Aviation
LAR-12808 B84-10111 06
HAYNES, D. P.
Adjustable Mount
LAR-13100 B84-10352 06
HEADRICK, E. L.
Bonding Technique for Stiffened-Skin Structures
NPO-15994 B84-10386 08
HEAPS, J. D.
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08
HELD, D.
Bistatic Synthetic-Aperture Radar
NPO-15619 B84-10272 02
HELD, D. N.
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
HELLER, C.
Capture-Range Indicator
MFS-28008 B84-10354 06
HERNANDEZ, R. J.
Countersink Drill
MFS-19852 B84-10163 07
HESS, R. W.
Dynamic Calibration of Pressure Transducers
LAR-13094 B84-10335 06
HESSE, R. H.
Temperature Compensation for a Frequency-Modulated Oscillator
MSC-20556 B84-10249 01
HILL, G. M.
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
HILT, D. E.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
HINES, R. W.
Twist-Free Wire Stranding
MFS-25914 B84-10025 01

HOBBES, P. H.
Welding Many Thin Metal Layers
MSC-20698 B84-10398 08
HOFFMAN, A. R.
Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
HOFFMAN, P. S.
High-Frequency, High-Power Capacitor
LEW-14034 B84-10225 01
HOLT, J. W.
Bonding Heat-Resistant Fabric to Tile
MSC-20540 B84-10396 08
HOLT, W. L.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
HOOKE, A. J.
Packet Telemetry and Packet Telecommand
NPO-16301 B84-10276 02
HOOPER, S.
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
HOWARD, L. D.
Estimates of Small Signal/Noise Ratios
NPO-15653 B84-10257 02
HOWARD, R. F.
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
HOWELL, B.
A General Optical Systems Evaluation Program
GSC-12823 B84-10057 03
HSU, I. S.
Reed-Solomon Encoder
NPO-16074 B84-10048 02
HUANG, L.
Evaluating Solar Collectors
NPO-15733 B84-10068 03
HUGHES, R. D.
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01
HUGHES, T. B.
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06

I

IMAMURA, M. S.
Controlling Solar-Power Systems With Distributed Processors
NPO-15101 B84-10259 02
ISAACS, A. M.
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06
ISLAM, M.
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09

J

JACKSON III, E.
Diverter Lip for Seal
MFS-19891 B84-10168 07
JACKSON, E. D.
Prewhirl Jet Model
MFS-19826 B84-10136 06
JACKSON, R. Q.
Estimation of Grounding-Strap Resistances
MSC-20694 B84-10241 01
JACOBSON, G.
Software-Implementation Plan
NPO-16123 B84-10223 09
JAFFE, P.
Determining The Life Expectancy of Photovoltaic Systems
NPO-15683 B84-10253 01
JAHNSEN, V. J.
Dialysis Extraction for Chromatography
NPO-15691 B84-10100 05
JAIN, A.
Report on Satellite Radar for Detecting Ocean Currents
NPO-15704 B84-10032 02
JAMIESON, R. S.
Negatively Coupled Inductors for Odd-Phase Choppers
NPO-15380 B84-10017 01
Memory-Metal Stepping Motor
NPO-15482 B84-10167 07
Improved Optical Keyboard
NPO-15132 B84-10254 01
JANKOWSKI, S. C.
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06
JASTER, H.
Evening Flow Distribution Through Parallel Tubes
MFS-23936 B84-10373 07
JENCEK, P.
Garter Valves
MFS-19899 B84-10359 07
JENSEN, C. L.
Thermal Radiation Analyzer
MSC-20448 B84-10133 06
JENSEN, M.
Prewhirl Jet Model
MFS-19826 B84-10136 06
JOANIDES, J. C.
Deriving Strain Modes From Vibrational Tests
MSC-20587 B84-10339 06
JOHNSON JR., J. L.
Over-the-Wing Propeller Reduces Wing Drag
LAR-13134 B84-10328 06
JOHNSON, C.
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
JOHNSON, C. B.
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06
JOHNSON, D.
Diverter Lip for Seal
MFS-19891 B84-10168 07
JOHNSON, W. C.
Measuring Clearance Indirectly
MFS-19875 B84-10355 06
JOHNSTON, G. D.
Insulation Debond Detection
MFS-25862 B84-10324 06
JONES, A.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
JONES, G.
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
JONES, H. C.
Adjustable Mount
LAR-13100 B84-10352 06
JONES, I. W.
Adjustable Mount
LAR-13100 B84-10352 06
JONES, J. A.
Detection of Gas Slugs in Heat Pipes
NPO-16064 B84-10144 06
Decontaminating Aluminum/Ammonia Heat Pipes
NPO-16066 B84-10179 08

K

KAKAR, R. K.
Retrieval of Geophysical Parameters From Radiometric Data
NPO-16266 B84-10286 03
KALEJS, J. P.
Gas Atmospheres Improve Silicon-Ribbon Quality
NPO-15129 B84-10393 08
KALVINSKAS, J.
Desulfurization of Coal in Fluidized Beds
NPO-15924 B84-10303 04
KAN, K.
Conserving Purge Gases
MFS-19625 B84-10140 06
KARIMI-DECHESH, A.
Data-Generating Program for ASKA Modeling
MSC-20644 B84-10134 06
KATZ, J.
Semiconductor Laser Phased Array
NPO-15963 B84-10006 01
Integrated Laser and Light Detector
NPO-15943 B84-10230 01
Direct-Photon-Detection Communications
NPO-15905 B84-10256 02
KAVAYA, M. J.
Transfer-Function Simulator
NPO-15696 B84-10046 02
Adjustable-Frequency Spectrophone Laser Stabilization
NPO-15516 B84-10067 03
KELLY, T. R.
Standard Fastener Library
MSC-20645 B84-10153 07
KENDALL SR., J. M.
Ten Thousand Solar Constants Radiometer
NPO-15922 B84-10290 03
KHATIB, A. R.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
KICENIUK, T.
Support System for Solar Receivers
NPO-15749 B84-10072 03
KILGROVE, T. O.
Measuring Side Loads On Bolts
NPO-15705 B84-10137 06
KILLGROVE, T. O.
Stepped-Pin Clevis Resists Jamming
NPO-15834 B84-10146 07
Kick-Free Pressure Release Valve
NPO-16078 B84-10165 07
KING JR., W.
Handling Software Requests for Commands
KSC-11226 B84-10217 09

KLAASEN, K. P.
High-Resolution vice Camera
NPO-15086 B84-10275 02
KLEINE, H.
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
KLEINT, R. E.
Tube-Wall Thickness Detector
MFS-19741 B84-10024 01
KNADLER, J.
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04
KNAPP, K.
Coilable-Column Development
MFS-27032 B84-10142 06
KNOX, C. E.
Fuel-Conservative Descents Using A Programable Calcultor
LAR-13138 B84-10333 06
KOCH, E. F.
Linear Boom Actuator
NPO-16099 B84-10374 07
KOFAL, A.
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
KOLB, W.
Research-Concept Evaluation
LAR-13143 B84-10206 09
KOLBLY, R. B.
Platinum-Resistor Differential Temperature Sensor
NPO-15666 B84-10252 01
KOLIWAD, K. M.
Activated Internal Gettering
NPO-15530 B84-10316 04
KRASIN, F. E.
Discriminator Aids Phase-Lock Acquisition
NPO-14311 B84-10233 01
KROY, R. E.
Low-Stress Sealing of Pressure Transducers
MFS-19877 B84-10114 06
KUHR, G.
Acousto-optic Extensometer for Bolts
MFS-19914 B84-10336 06
Ignition-Spark Detector for Engine Testing
MFS-19890 B84-10365 07
KUMAR, K.
Samarium/Cobalt Magnets
MFS-27006 B84-10088 04
KURAL, M.
Properties of Low-Expansion Laminates
MFS-25859 B84-10082 04
KURTZ, D. W.
Aerodynamic Design of Road Vehicles
NPO-15474 B84-10154 07
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07

L

LAHMEYER, C. R.
Real-Time Reed-Solomon Decoder
NPO-15982 B84-10228 01
LAL, R. B.
Reciprocating Crystallizer
MFS-25948 B84-10196 08
LALLANDE, J. B.
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07
LANCASTER, R.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04
LANG, C. H.
Structural Turnbuckle Bears Compressive or Tensile Loads
MFS-25939 B84-10106 06
LANGSTON, L.
Surface-Streamline Flow Visualization
LEW-13875 B84-10105 06
LANSING, F. L.
Solar-Power System Produces High-Pressure Steam
NPO-15434 B84-10288 03
LAWSON, C. L.
Antenna Radiation-Pattern Program
NPO-16217 B84-10015 01
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
LAYLAND, J. W.
Intercomputer Communication Link
NPO-13446 B84-10029 02
LEE, C. P.
Acoustic Position Servosystem
NPO-15936 B84-10407 08
LEE, J. J.
Design Primer for Reed-Solomon Encoders
NPO-15568 B84-10205 09
Test Sequences for Reed-Solomon Encoders
NPO-15542 B84-10224 09
LEE, M. C.
Applying Uniform Polymer Coatings To Microspheres
NPO-16075 B84-10308 04
Acoustic Levitation System
NPO-16146 B84-10406 08
LEGERTON, V. N.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
LEIBOWITZ, L. D.
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03
LEISER, D. B.
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
LEPISTO, J. W.
Circuit for Monitoring Cell Voltages
MFS-25924 B84-10008 01
LESAK, P.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
LESH, J. R.
Integrated Laser and Light Detector
NPO-15943 B84-10230 01
Direct-Photon-Detection Communications
NPO-15905 B84-10256 02
LEUNG, E. W.
Acoustic Sorter for Small Parts
NPO-15913 B84-10198 08
Acoustic Position Servosystem
NPO-15936 B84-10407 08
LEVY, R.
More Efficient Structural Design by Optimality Criteria
NPO-15832 B84-10219 09
LEWIS, B. F.
Preparing InSb Substrates
NPO-16127 B84-10317 04
LEWIS, G. W.
Transducers For Heat Research
NPO-15095 B84-10094 05
LILLEY, D.
Turbulent Recirculating Flows in Isothermal Combustor Geometries
LEW-13894 B84-10128 06
LINES, G.
Setup Aid for Electrical-Discharge Machining
MFS-19874 B84-10370 07
LIRETTE, M.
Automatic Robot Safety Shutdown System
MFS-25969 B84-10368 07
LIU, J. K.
Activated Internal Gettering
NPO-15530 B84-10316 04
LIU, T. M.
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03
LOCKWOOD, R. A.
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
LOESH, R. E.
Managing Software Design and Design Changes
NPO-15331 B84-10416 09
LOMBARDI, F.
Vacuum Seal Permits Limited Rotation
NPO-15115 B84-10150 07
LONBORG, J. O.
Digital Sequence Controller
NPO-15725 B84-10012 01
Wire-Identification Instrument
NPO-15633 B84-10027 02
Measuring Air-Ionizer Output
NPO-16058 B84-10242 01
LOVELADY, R. W.
Fabricating Underwater Electroacoustic Transducers
LAR-13007 B84-10381 08
LUCAS, J. W.
Point-Focusing Solar-Power Distributed Receivers
NPO-15578 B84-10294 03
LUEBKERT, W. J.
Source Pre-Processor or Interface-Specification Language
NPO-15814 B84-10413 09
LUPO, G.
Hybrid-Vehicle Transmission System
NPO-16119 B84-10372 07
LUSHBAUGH, W. A.
Intercomputer Communication Link
NPO-13446 B84-10029 02
LUTES, G. F.
Splicing Efficiently Couples Optical Fibers
NPO-16294 B84-10403 08

M

MA, S.
Streaming-Potential Studies
MFS-25657 B84-10092 04
MACCONNELL, J.
Improved RF Isolation Amplifier
NPO-16026 B84-10011 01

MACDAVID, K. S.
Tape-Mounted Thermocouple
NPO-16291 B84-10400 08
MACDONALD, D.
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03
MACDORAN, P. F.
Calibrating for Ionospheric Phase Delays
NPO-15430 B84-10297 03
MACKINNON, I.
Specimen Holder for Analytical Electron Microscopes
MSC-20398 B84-10331 06
MACKINTOSH, B. H.
Contoured Orifice for Silicon-Ribbon Die
NPO-15126 B84-10394 08
MADDURY, R.
Desulfurization of Coal in Fluidized Beds
NPO-15924 B84-10303 04
MALEKI, L.
A Sensitive Infrared Photodetector
NPO-15926 B84-10022 01
MALONEY, T. J.
Connector-Array Attachment Matrix
NPO-15778 B84-10401 08
MANASEVIT, H.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
MANCINI, R.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
MANDEL, H.
Solder Bonding for Power Transistors
MSC-20570 B84-10387 08
MANGIALARDI, J. K.
Differential Pressure Helps Seal Ball Valve
MSC-20615 B84-10330 06
MANN, W. A.
Optical-Fiber-Welding Machine
NPO-15004 B84-10379 08
MANSON, S.
Double Linear Damage Rule for Fatigue Analysis
LEW-14058 B84-10103 06
MARAM, J.
Acousto-optic Extensometer for Bolts
MFS-19914 B84-10336 06
MARESCA, P.
Orbital and Geodetic Error Analysis
GSC-12768 B84-10415 09
MARGOLIS, J. S.
Frequency-Modulation Correlation Spectrometer
NPO-15558 B84-10061 03
MARKE, M. L.
Standard Fastener Library
MSC-20645 B84-10153 07
MARLOWE, P.
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
MARTONCHIK, J. V.
Frequency-Modulation Correlation Spectrometer
NPO-15558 B84-10061 03
MARX, W.
Beam-Cap-Forming Machine
MFS-27007 B84-10183 08
MASERJIAN, J.
Light-Activated Microwave Device
NPO-16112 B84-10234 01
MATHIPRAKASAM, B.
Rapid Freezing-Point Measurement
LEW-14019 B84-10279 03
MCCREE, J. O.
Vented Compression Molding of Granule-Filled Resins
MFS-25975 B84-10181 08
MCDOUGAL, A. R.
High-Temperature Pump
NPO-15783 B84-10376 07
MCGARITY, J.
Gas-Density Gage
MFS-28011 B84-10353 06
MCLAUCHLAN, J. M.
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03
MCLYMAN, C. W.
Lightweight Regulated Power Supply
NPO-15977 B84-10236 01
Solid-State Latching Relay
NPO-15028 B84-10250 01
MCMAHON, S. K.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
MCMASTER, K. M.
Assessing Energy-Generating Systems
NPO-16159 B84-10056 03
MCMULLEN, J.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
MEERBAUM, S.
Transducers For Heat Research
NPO-15095 B84-10094 05
MEIER, D. L.
Improved Melt-Level Control System
NPO-15900 B84-10192 08
MELL, R. J.
High-Temperature Coating for Titanium
NPO-16222 B84-10311 04
MELOSH, R.
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
MELOSH, R. J.
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09
MENG, S. Y.
Prewhirl Jet Model
MFS-19826 B84-10136 06
MENNA, A. A.
Machining of Silicon-Ribbon-Forming Dies
NPO-15127 B84-10173 08
MENNINGER, F. J.
Solar-Powered Water Distillation
NPO-15894 B84-10069 03
MENZIES, R. T.
Precise Control of a Tunable IR Diode Laser
NPO-16000 B84-10023 01
Adjustable-Frequency Spectrophone Laser Stabilization
NPO-15516 B84-10067 03
Laser Pollutant-Measuring Systems
NPO-16101 B84-10285 03
METHNER, L. H.
Measuring the Liquid Content of a Gas
MFS-25990 B84-10343 06
MICALE, F.
Parameters Affecting Electrophoresis
MFS-25593 B84-10099 05
MIKULAS JR., M. K.
Synchronously Deployable Truss
LAR-13117 B84-10350 06
MIKULAS JR., M. M.
Deployable Geodesic Truss
LAR-13113 B84-10351 06
MILLER, J.
Measuring Rind Thickness on Polyurethane Foam
MFS-25941 B84-10116 06
MILLER, M. A.
Price Estimation Guidelines
NPO-15569 B84-10186 08
MINES, R. G.
Acquisition of Dynamic Stress/Strain Data
MSC-20589 B84-10122 06
MISH, W. H.
Interactive Digital Signal Processor
GSC-12862 B84-10268 02
MITCHELL, R. T.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
MOLHO, R.
Strong, Lighweight Curved Panels
MSC-16278 B84-10399 08
MOLINA, O. G.
Tool for Inserting and Removing Tube Plugs
MFS-19871 B84-10364 07
MOLKO, P. M.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
MON, G. R.
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
MOOK, G. L.
Programable Multicrate Controller
MFS-25533 B84-10042 02
MOORE, D. M.
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
MOORE, E. B.
Upgrading Metallurgical-Grade Silicon
NPO-15076 B84-10074 04
MORRIS, R. V.
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
MORRISON, A. D.
Fluidized-Bed Reactor System
NPO-15975 B84-10087 04
Reciprocating Saw for Silicon Wafers
NPO-15863 B84-10171 08
Automatically Dressing Blades in Silicon-Wafer Cutting
NPO-15745 B84-10174 08
MOSER, R. L.
Automatic Monitoring of Switching Power Supplies
MFS-25968 B84-10028 02

Controlling Solar-Power Systems With Distributed Processors
NPO-15101 B84-10259 02

MOYER, T. D.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

MUKHERJEE, S. P.
Pure Glasses From Multicomponent Gels
NPO-16160 B84-10079 04

MUSCARI, J. A.
Vacuum Baking To Remove Volatile Materials
NPO-15648 B84-10080 04

N

NAGANO, S. S.
Pulsed-Current Transducers
NPO-14048 B84-10251 01

NAUMANN, R. J.
Containerless Manufacture of Glass Optical Fibers
MFS-25905 B84-10075 04

NEAD, M. W.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

NELSON, C. W.
X-Ray Determination of Weld Misalinement
MSC-20418 B84-10323 06

NELSON, D.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04

NELSON, L. D.
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08

NELSON, R. A.
Collapsible and Deployable Trusses
MFS-25945 B84-10177 08

NELSON, T.
Conserving Purge Gases
MFS-19625 B84-10140 06

NGUYEN, S. N.
Generating Tables of Thermodynamic Properties
MSC-20701 B84-10130 06

NISHINO, S.
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08

NOLA, F.
Powerline Coupler for Windmill Motor/Generators
MFS-25944 B84-10010 01

NOLA, F. J.
Solar-Powered Flywheel
MFS-25978 B84-10157 07

NUMMELIN, J.
Differential-Coil Eddy-Current Material Sorter
MFS-19872 B84-10231 01

O

OEPOMO, T.
LRU Voltage Analysis
MSC-20699 B84-10035 02

OKIN, L.
Hall-Effect Ground-Fault Interruptor
NPO-15915 B84-10255 01

OLSCHANSKY, D. G.
Improved Spark-Ignitor Circuitry
MFS-19751 B84-10019 01

OLSON, G. O.
Lightning Protection for Composite Aircraft Structures
LAR-12879 B84-10120 06

ONISKO, D. B. L.
Inhibiting Wet Oxidation of Ammonia
ARC-11407 B84-10307 04

ORONATO, P. I.
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04

ORTENDAHL, J. A.
Soft-X-Ray Prefilter for Hot, Bright Objects
NPO-15972 B84-10060 03

OSTERWISCH, F. G.
Thermal Compensator for Paraboloidal Reflector
NPO-16145 B84-10301 03

OTT, F. M.
Capacitor-Test System
NPO-16485 B84-10038 02

OUZTS, G.
Priority-Based Dispatching Algorithm
KSC-11277 B84-10218 09

P

PAGE, D. J.
Production Line for Dendritic-Web Solar Cells
NPO-15098 B84-10172 08

PAGE, N. A.
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03
Composite Spectrometer Prisms
NPO-16060 B84-10300 03

PALMER, R. J.
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06

PANAGIOTACOPULOS, N. D.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

PANDEY, P. C.
Retrieval of Geophysical Parameters From Radiometric Data
NPO-16266 B84-10286 03

PARTHASARATHY, S. P.
Microphone Detects Boiler-Tube Leaks
NPO-16027 B84-10348 06

PASCUA, A. G.
Tool for Inserting and Removing Tube Plugs
MFS-19871 B84-10364 07

PATON, N.
Increasing the Ductility of Electroplated Metals
MFS-19873 B84-10304 04

PAVLOVITCH, T.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06

PEARSON, M.
Structural Analysis of Cylindrical Thrust Chambers
LEW-13655 B84-10127 06

PELISCHEK, T. E.
Joint For Erectable and Collapsible Frames
MSC-20635 B84-10119 06

PERKINS, G. S.
Flexible Mirror Mount for Michelson Interferometer
NPO-15746 B84-10066 03

PERLMAN, M.
Design Primer for Reed-Solomon Encoders
NPO-15568 B84-10205 09

PESSIN, R.
Annular-Tube Reinforcer
MFS-19738 B84-10201 08

PHAM, H. Q.
Solar-Thermal-Desalination Study
NPO-15795 B84-10071 03

PHILLIPS, M. R.
Programable Multicrate Controller
MFS-25533 B84-10042 02

PHILLIPS, W. H.
Propeller Design Program
LAR-13141 B84-10371 07

PIRICH, R. G.
Eutectic-Alloy Morphology
MFS-25937 B84-10084 04

POIT, W. J.
Eutectic-Alloy Morphology
MFS-25937 B84-10084 04

POLAND, W. W.
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07

POLZIEN, E. D.
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08

POON, P. T.
Evaluating Solar Collectors
NPO-15733 B84-10068 03

PORTER, A. J.
Insulation Debond Detection
MFS-25862 B84-10324 06

PORTWOOD, J. N.
Insulation Debond Detection
MFS-25862 B84-10324 06

POSNER, E. C.
Error Correction for Tandem Data-Transmission Paths
NPO-16125 B84-10417 09

POWELL, J.
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08

PREISWERK, P. R.
Coilable-Column Development
MFS-27032 B84-10142 06

PRICE, T. W.
Performance Testing of the DOE Electric Test Vehicle
NPO-15660 B84-10161 07

PRISK, A. L.
Stripping the Sheath From Stranded Cables
NPO-15082 B84-10390 08

PROUTY, T.
LRU Voltage Analysis
MSC-20699 B84-10035 02

PSALTIS, D.
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03

Q

QADER, S. A.
Solar-Heated Gasifier
NPO-15071 B84-10293 03

R

RAINES, J. K.
Theoretical Investigation Of Dielectric Horn Antennas
GSC-12876 B84-10245 01
RAMANI, V.
Inert-Gas Electrical Discharge Machining
MFS-19778 B84-10162 07
EDM Electrode for Internal Grooves
MFS-19733 B84-10369 07
REED, I.
Parallel VLSI Architecture
NPO-16124 B84-10420 09
REED, I. S.
Reed-Solomon Encoder
NPO-16074 B84-10048 02
Simplified Convolution Codes
NPO-16251 B84-10418 09
REILLY, H. F.
Efficient Reflector Antenna
NPO-16262 B84-10239 01
REVERE, W. R.
Paraboloidal-Dish Power Modules
NPO-16100 B84-10302 03
RHODE, D.
Turbulent Recirculating Flows in Isothermal Combustor Geometries
LEW-13894 B84-10128 06
RHODES JR., E. J.
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
RHODES, C.
Increasing the Ductility of Electroplated Metals
MFS-19873 B84-10304 04
RHODES, M. D.
Deployable Geodesic Truss
LAR-13113 B84-10351 06
RICE, R. F.
Remote-Imaging Parameters
NPO-14869 B84-10041 02
RICHARDSON, J.
Photographic Screening for Eye Defects
MFS-27045 B84-10322 05
RICHTER, R.
Measuring Absolute Oxygen Pressure
NPO-16131 B84-10113 06
Sealing Mechanical Cryogenic Coolers
NPO-15139 B84-10149 07
RIVES, C.
Thermal-Expansion Measurement
MFS-27000 B84-10064 03
ROBERTSON JR., C.
A Ceramic Heat Exchanger for Solar Receivers
NPO-15771 B84-10296 03
ROBINSON, K.
Fabrication of Thick Gold Strip Lines
NPO-16238 B84-10190 08
RODGERS, J. M.
Composite Spectrometer Prisms
NPO-16060 B84-10300 03
RON, D.
Communication Program Emulates Switchboard
MFS-19917 B84-10270 02
ROSS JR., R. G.
Assessing the Performance of Solar Arrays
NPO-15277 B84-10070 03
Maximum Outputs of Solar Photovoltaic Arrays
NPO-15966 B84-10284 03
Predicting the Reliability of Solar-Cell Interconnections
NPO-15976 B84-10410 09
ROSS JR., W. D.
Sorting Titanium Welding Rods
MSC-20588 B84-10383 08
ROSS, B.
Eutectic Contact Inks for Solar Cells
NPO-15171 B84-10305 04
ROSSI, P. J.
Edge Labels for Multilayer Circuit Boards
MSC-20704 B84-10388 08
ROTTA, J. W.
Stripping the Sheath From Stranded Cables
NPO-15082 B84-10390 08
RUBIN, A. L.
Error Correction for Tandem Data-Transmission Paths
NPO-16125 B84-10417 09
RUDNICK, I.
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
RUITBERG, A. P., KENNETHM.
Battery-Operated High-Voltage Power Supply
GSC-12818 B84-10001 01
RUMMEL, W. D.
Reliability Studies for Fatigue-Crack Detection
MFS-27031 B84-10085 04
RUOFF, C. F.
Eye-Movement Tracker Would Reduce Video Bandwidth
NPO-15432 B84-10043 02
Faster Response for Memory-Metal Actuators
NPO-16120 B84-10148 07
RUTLEDGE, C. W.
Precise Control of a Tunable IR Diode Laser
NPO-16000 B84-10023 01

S

SALADEE, C. E.
Reusable Thermal Barrier for Insulation Gaps
MSC-20519 B84-10329 06
SALAMA, M.
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09
SALAMA, M. A.
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
SALOMON, P. M.
Isolation Mounting for Charge-Coupled Devices
NPO-15551 B84-10005 01
Quicker Selection of CCD Images
NPO-15345 B84-10274 02
SANBORN, J. A.
Dynamic Simulation and Stability Analysis
GSC-12810 B84-10123 06
SANCIER, K.
Silicon Formation for Solar Cells
NPO-14973 B84-10313 04
SAUNDERS, J. M.
Insulation Debond Detection
MFS-25862 B84-10324 06
SCHAECHTER, D. B.
Calculating Closed-Loop Sensitivity to Parameter Variations
NPO-15941 B84-10202 09
SCHLAFF, J. W.
Brazing Alloys Indicate Turbomachinery Temperatures
MFS-19792 B84-10327 06
SCHNEIDER, H. W.
Testing Ceramics for Diesel Engines
NPO-15824 B84-10078 04
SCHOTT, C. F.
Eliminating False Signals From Electromechanical Keyboards
MSC-20429 B84-10044 02
SCHROEDER, J. E.
Stabilized Aluminum Titanate
NPO-16227 B84-10319 04
SCHWUTTKE, G. H.
Activated Internal Gettering
NPO-15530 B84-10316 04
SHACK, R. V.
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03
SHANNON, R.
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
SHANNON, R. R.
Reflecting Schmidt/Littrow Prism Imaging Spectrometer
NPO-15801 B84-10277 03
SHAO, H.
Parallel VLSI Architecture
NPO-16124 B84-10420 09
SHEN, D.
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
SHEN, D. S.
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
SHIMADA, K.
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
SHLICHTA, P. J.
Hot-Dipped Metal Films as Epitaxial Substrates
NPO-15904 B84-10178 08
Minimizing Convection During Crystal Growth
NPO-15811 B84-10194 08
SIMON, W. C.
Orbital Mechanics Analysis Program
MSC-20700 B84-10132 06
SIMONTON, J. W.
Deployable Geodesic Truss
LAR-13113 B84-10351 06
SKOUMAL, D. E.
Efficient Joints for Graphite/Epoxy Structures
LAR-13091 B84-10121 06
SLONSKI, M. L.
Solar/Thermal Powerplant Simulation
NPO-15440 B84-10058 03

SLUSSER, R. A.
Electric/Hybrid Vehicle Simulation
NPO-15229 B84-10034 02
SMILOWITZ, K.
Quicker Selection of CCD Images
NPO-15345 B84-10274 02
SMISER, L. W.
Bonding Heat-Resistant Fabric to Tile
MSC-20540 B84-10396 08
SMITH, D. D.
Reducing Thermal Expansivity of Composite Panels
MFS-25793 B84-10117 06
SMITH, E. J.
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03
SMITH, M.
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
SNYDER, C.
Automated Texturization of Silicon Wafers
NPO-15816 B84-10195 08
SNYDER, L. M.
High-Resolution
vice Camera
NPO-15086 B84-10275 02
SNYTSHEUVEL, H.
Calculating Strain Relief in Electronic-Component Leads
MSC-20416 B84-10248 01
SNYTSHEUVEL, H. A.
Solder Bonding for Power Transistors
MSC-20570 B84-10387 08
SOCLOF, S.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
SOMOANO, R.
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
SOMOANO, R. B.
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
SPENCER, H. F.
Fluorescent Gage Indication
ARC-11397 B84-10384 08
SPINAK, A.
Software-Implementation Plan
NPO-16123 B84-10223 09
SRIVASTAVA, S. K.
A Sensitive Infrared Photodetector
NPO-15926 B84-10022 01
SRIVATSA, S.
Computation of Three-Dimensional Combustor Performance
LEW-13930 B84-10129 06
STACY, L.
A Ceramic Heat Exchanger for Solar Receivers
NPO-15771 B84-10296 03
STAINBACK, P. C.
Constant-Operating-Resistance Wire Probe
LAR-13144 B84-10341 06
Hot-Wire Probe for Compressible Subsonic Flow
LAR-13051 B84-10342 06
STALLONE, M.
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
STANICH, C. G.
Thermal Compensator for Paraboloidal Reflector
NPO-16145 B84-10301 03
STANTON, P. H.
Circularly-Polarized Microstrip Antenna
NPO-15875 B84-10009 01
STANTON, R. H.
Measuring Tracking Accuracy of CCD Imagers
NPO-15665 B84-10260 02
STEIN, B. A.
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
STELLA, P. M.
Stowable Solar-Cell Array
NPO-15893 B84-10020 01
STERLING JR., S. E.
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08
STERMER JR., R.
High-Mobility Epitaxial Silicon Wafers
LAR-12846 B84-10175 08
STEVENS, G. L.
Improved RF Isolation Amplifier
NPO-16026 B84-10011 01
STEWART, D. A.
Heat-Shield Gap Filler
ARC-11310 B84-10408 08
STONEBURNER, J. D.
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
STORAASLI, O. O.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09
STORACE, A.
Turbine-Engine Transient-Rotor Analysis
LEW-13726 B84-10125 06
STRANG, R.
NASTRAN NASTPLT Plotting Post Processor
GSC-12833 B84-10215 09
SUMMERS, R.
Integrated Exhaust-Gas-Analysis System
LEW-14062 B84-10337 06
SUMMERS, R. A.
Capacitor-Test System
NPO-16485 B84-10038 02
SUNSERI, R. F.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
SYDNOR, R. L.
Tuning Concept for Resonant Cavities
NPO-15890 B84-10004 01
SZETELA, E.
Heat-Exchanger Computational Procedure For Temperature-Dependent Fouling
LEW-13874 B84-10126 06

T

TALBOT, T. D.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
TAM, Y. S.
Clamp Secures Material to Cylinder Base
MFS-19479 B84-10158 07
TAUSWORTHE, R. C.
Software Cost-Estimation Model
NPO-15862 B84-10209 09
Software Design Analyzer System
NPO-16234 B84-10210 09
TEJWANI, J. J.
Standard Fastener Library
MSC-20645 B84-10153 07
THEORDORE, E. A.
Inexpensive Pressure-Relief Valve
MSC-20518 B84-10155 07
THOMAS, W. F.
Monitoring Performance of Complex Systems
KSC-11273 B84-10031 02
THURMOND, G. D.
Reversing Optical Damage In LiNbO3 Switches
NPO-16239 B84-10227 01
TIETZ, J. C.
Angle-Measurement and Ranging System
MFS-25912 B84-10053 03
TOLPEN, J.
A Positive-Shutoff Fuel Valve
MFS-19779 B84-10145 06
TORBET, W.
Two-Crucible Czochralski Process
NPO-15110 B84-10170 08
TORBORG, C. J.
Two-Pulse Stitch Welding
MFS-25716 B84-10188 08
TROUNG, T. K.
Reed-Solomon Encoder
NPO-16074 B84-10048 02
TRUONG, T. K.
Simplified Convolution Codes
NPO-16251 B84-10418 09
Parallel VLSI Architecture
NPO-16124 B84-10420 09
TSITSIVAS, H. N.
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09
TU DUC, D.
Adjustable Tuning Spring for Bellows Pump
MSC-20512 B84-10378 07
TUBBS, E. F.
Laser Rangefinder and Remote Profilometer
NPO-15865 B84-10278 03
TUCCI, A. T.
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06
TULL, S.
Hinged Shields for Machine Tools
GSC-12915 B84-10366 07
TURNER, A. R.
Holder for Straightening Bent Tubes
MFS-19705 B84-10200 08
TURNER, R. H.
Fresnel-Lens/Heat-Storage System
NPO-16242 B84-10289 03
TURNER, T.
Interferometer Measures Broadband Surface Acoustic Waves
LAR-12966 B84-10050 03
TYERYAR, J. R.
Rapid Adhesive Bonding for Metals and Composites
LAR-13066 B84-10176 08

U

UDA, R.
Integrated System for Environmental Simulation
KSC-11274 B84-10065 03

UDWADIA, F.
Active Pulse Suppression of Structural Vibrations
NPO-15788 B84-10340 06

UHLMANN, D. R.
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04

ULRICH, R. K.
Instrumentation for Solar-Oscillation Measurements
NPO-15687 B84-10287 03

UTKU, S.
Algorithms for Finite-Element Equations
NPO-16029 B84-10222 09
Cost Considerations in Nonlinear Finite-Element Computing
NPO-16237 B84-10412 09

V

VAN MARK, G. D.
Maintaining Constant Load Cell Temperature
MSC-20333 B84-10143 06

VAN SNYDER, W.
Structured FORTRAN Preprocessor
NPO-15726 B84-10214 09

VAN WAGENEN, R.
Streaming-Potential Studies
MFS-25657 B84-10092 04

VANDERHOFF, J.
Parameters Affecting Electrophoresis
MFS-25593 B84-10099 05

VASQUEZ, R. P.
Preparing InSb Substrates
NPO-16127 B84-10317 04

VILNROTTER, V. A.
Optical Quantum Receiver For Binary Signals
NPO-15122 B84-10030 02

VITTONE, O.
Advanced dc-Traction-Motor Control System
NPO-16118 B84-10229 01

VIVIAN, H. C.
Power Train for Hybrid Electric Vehicle
NPO-15742 B84-10377 07

VOGT, R. A.
Thermal Radiation Analyzer
MSC-20448 B84-10133 06

VON LIMBACH, G.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09

VON TIESENHAUSEN, G. F.
Magnetic Despinning System
MFS-25966 B84-10166 07

VYDYANATH, H.
Defect Chemistry of Hg1-xCdxTe
MFS-25851 B84-10309 04

W

WADE, J. C.
Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06

WAGNER, A. P.
Direct-Current Unbalance Detector
NPO-15978 B84-10007 01

WAGNER, W. R.
Preventing Fires in Cryogenic Oxidizer Lines
MFS-19830 B84-10115 06
Lightweight High-Temperature Thermal Insulation
MFS-19754 B84-10306 04

WAHLSTROM, S. O.
Relational Information Management Data-Base System
LAR-12943 B84-10207 09

WALD, F. V.
Gas Atmospheres Improve Silicon-Ribbon Quality
NPO-15129 B84-10393 08

WALKER, W.
Telescoping Shield for Point-Focusing Solar Concentrators
NPO-16236 B84-10283 03

WALKLEY, K. B.
Aerodynamic Analysis of Low-Speed Wing-Flap Systems
LAR-13116 B84-10124 06

WALLIS, D. E.
Fast Dual Analog-to-Digital Converter
NPO-15006 B84-10026 02
Low-Frequency Navigational System
NPO-15264 B84-10045 02
Priority Queuing On A Parallel Data Bus
NPO-15005 B84-10261 02

WALLSOM, R. E.
Synchronously Deployable Truss
LAR-13117 B84-10350 06

WANG, K.
Reed-Solomon Encoder
NPO-16074 B84-10048 02

WANG, P. K.
High-Resolution vice Camera
NPO-15086 B84-10275 02

WANG, T. G.
Acoustic Levitation With One Driver
NPO-15793 B84-10185 08
Acoustic Sorter for Small Parts
NPO-15913 B84-10198 08
Acoustic Levitation System
NPO-16146 B84-10406 08
Acoustic Position Servosystem
NPO-15936 B84-10407 08

WEBSTER, C. R.
Monitoring of Reactive Atmospheric Species
NPO-15981 B84-10063 03

WECHSLER, E. R.
Root-Locus Algorithms
NPO-16154 B84-10221 09

WEINBERG, M. C.
Mathematical Model for Gas Dissolution in Glass
NPO-15104 B84-10093 04

WEN, L. C.
Evaluating Solar Collectors
NPO-15733 B84-10068 03

WERNER, A.
EDM Electrode for Internal Grooves
MFS-19733 B84-10369 07

WESTBERG, B. O.
Measuring Clearance Indirectly
MFS-19875 B84-10355 06

WHIPPLE, R. D.
Compact Antispin Parachute System
LAR-12979 B84-10358 07

WHITE, C. W.
High-Frequency, High-Power Capacitor
LEW-14034 B84-10225 01

WHITE, M. J.
Research-Concept Evaluation
LAR-13143 B84-10206 09

WHITE, R.
Over-the-Wing Propeller Reduces Wing Drag
LAR-13134 B84-10328 06

WHITE, W. L.
Bridle Attachment for Aircraft Spin-Recovery Parachute
LAR-13076 B84-10357 07

WHITT, W. D.
Temperature-Gradient Furnace for Solidification Experiments
MFS-25963 B84-10101 06

WICKS, J.
Adding Stale-Data Flag to and Error-Correcting Code
KSC-11134 B84-10220 09

WILL, H.
Making Cubic Silicon Carbide Semiconductors
LEW-14018 B84-10392 08

WILLIAMS, C. J.
Reducing Stepping-Motor Power Consumption
MFS-25119 B84-10246 01

WILLIAMS, J. G.
Continuous-Filament Isogrid Composite Panel
LAR-12975 B84-10344 06

WILLIS, P. B.
Elastomer Encapsulant for Solar-Cell Arrays
NPO-15663 B84-10083 04

WILLOUGHBY, J. K.
Language for Allocation and Network Scheduling
MSC-20633 B84-10212 09

WILSON, A. H.
Snapring Quick Fastener
NPO-15724 B84-10402 08

WILSON, M.
A General Optical Systems Evaluation Program
GSC-12823 B84-10057 03

WILSON, M. L.
Fabricating Thin-Shell Heat-Transfer Models
LAR-13087 B84-10108 06

WITCHER, H. C.
Forklift Support Dolly
GSC-12916 B84-10147 07

WOERNER, L. M.
Upgrading Metallurgical-Grade Silicon
NPO-15076 B84-10074 04

WOICHESHYN, P. M.
Predicting Severe Duststorms
NPO-14999 B84-10411 09

WOLF, D. A.
Flexible Heat Pipe
GSC-12864 B84-10109 06

WOLVERTON, B. C.
Aquatic Plants Aid Sewage Filter
MFS-25808 B84-10095 05
WOOD, C.
Making Pure Fine-Grained Inorganic Powder
NPO-16398 B84-10086 04
Determining Thermal Diffusivities of Radiating Specimens
NPO-15436 B84-10325 06
WOODS JR., W. R.
Zero-Net-Charge Air Ionizer
NPO-15937 B84-10054 03
WU, C.
Contour-Mapping Synthetic-Aperture Radar
NPO-15939 B84-10265 02

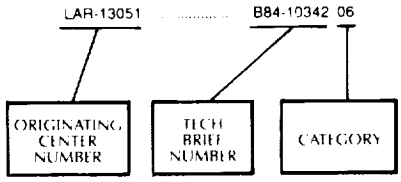
Y

YAMAKAWA, K. A.
Cleaning The Walls of A Silane Reactor
NPO-15851 B84-10318 04
YAMAMOTO, Y.
Techni-kits and Techni-kit Building Systems
NPO-15956 B84-10203 09
YANG, L. C.
Fiber-Optic Equipment for Power-System Control
NPO-15968 B84-10266 02
YEEMAN, L.
Temperature-Stabilized Phase Detector
NPO-15766 B84-10016 01
YEH, C.
Parallel VLSI Architecture
NPO-16124 B84-10420 09
YEH, C. S.
Reed-Solomon Encoder
NPO-16074 B84-10048 02
YEN, S. P. S.
High-Cycle-Life Lithium Cell
NPO-15921 B84-10232 01
Elastomeric Cathode Binder
NPO-15424 B84-10315 04
YOUNG, J. W.
Deriving Strain Modes From Vibrational Tests
MSC-20587 B84-10339 06
YOUNG, W.
Forklift Support Dolly
GSC-12916 B84-10147 07
YUEN, J. H.
Convolutionally-Coded Unbalanced QPSK Systems
NPO-15566 B84-10267 02

Z

ZEBKER, H. A.
Target Simulator for Synthetic-Aperture Radars
NPO-15024 B84-10262 02
ZEPKO, T. M.
SDDL: Software Design Documentation Language
NPO-16201 B84-10208 09
ZERWEKH, P. S.
Acoustic Gaussian Far-Field Pattern Interferometer Detects Acoustic Emissions in Composites
LAR-12965 B84-10112 06
ZIELENBACH, J. W.
Trajectory Analysis and the Orbit Determination
NPO-15586 B84-10131 06
ZIMMERMAN, D. K.
Receiver For Solar Air Turbine
NPO-15124 B84-10052 03
ZIMMERMAN, W. F.
Safety Evaluation Methodology for Mining Systems
NPO-15831 B84-10375 07
ZOHAR, S.
Multiple-User Adaptive-Array Communication System
NPO-15765 B84-10037 02
ZOOK, J. D.
Top-Coating Silicon Onto Ceramic
NPO-15125 B84-10395 08
ZOUTENDYK, J. A.
Gravitational Effects on Crystal Growth by Vapor Transport
NPO-15853 B84-10391 08

Typical Originating Center Number Index Listing



The left hand column identifies the originating Center number, to the right of each originating Center number is the Tech Brief number, e.g., B84-13030, followed by a two-digit number, e.g., 03, which identifies the subject category containing the entire citation.

ARC-11310 ..... B84-10408 08
ARC-11397 ..... B84-10384 08
ARC-11407 ..... B84-10307 04
ARC-11463 ..... B84-10349 06

FRC-11072 ..... B84-10347 06

GSC-12768 ..... B84-10415 09
GSC-12810 ..... B84-10123 06
GSC-12818 ..... B84-10001 01
GSC-12823 ..... B84-10057 03
GSC-12833 ..... B84-10215 09
GSC-12861 ..... B84-10414 09
GSC-12862 ..... B84-10268 02
GSC-12864 ..... B84-10109 06
GSC-12876 ..... B84-10245 01
GSC-12915 ..... B84-10366 07
GSC-12916 ..... B84-10147 07

KSC-11134 ..... B84-10220 09
KSC-11226 ..... B84-10217 09
KSC-11257 ..... B84-10199 08
KSC-11273 ..... B84-10031 02
KSC-11274 ..... B84-10065 03
KSC-11277 ..... B84-10218 09
KSC-11283 ..... B84-10243 01

LAR-12808 ..... B84-10111 06
LAR-12846 ..... B84-10175 08
LAR-12879 ..... B84-10120 06
LAR-12943 ..... B84-10207 09
LAR-12944 ..... B84-10207 09
LAR-12945 ..... B84-10207 09
LAR-12965 ..... B84-10112 06
LAR-12966 ..... B84-10050 03
LAR-12967 ..... B84-10051 03
LAR-12974 ..... B84-10346 06
LAR-12975 ..... B84-10344 06
LAR-12979 ..... B84-10358 07
LAR-12991 ..... B84-10345 06
LAR-13007 ..... B84-10381 08
LAR-13030 ..... B84-10281 03
LAR-13051 ..... B84-10342 06
LAR-13066 ..... B84-10176 08
LAR-13070 ..... B84-10380 08
LAR-13076 ..... B84-10357 07
LAR-13087 ..... B84-10108 06
LAR-13091 ..... B84-10121 06
LAR-13094 ..... B84-10335 06
LAR-13100 ..... B84-10352 06
LAR-13113 ..... B84-10351 06
LAR-13116 ..... B84-10124 06
LAR-13117 ..... B84-10350 06
LAR-13119 ..... B84-10397 08
LAR-13134 ..... B84-10328 06
LAR-13138 ..... B84-10333 06
LAR-13140 ..... B84-10282 03
LAR-13141 ..... B84-10371 07
LAR-13142 ..... B84-10371 07
LAR-13143 ..... B84-10206 09
LAR-13144 ..... B84-10341 06
LAR-13157 ..... B84-10334 06

LEW-10455 ..... B84-10361 07
LEW-13655 ..... B84-10127 06
LEW-13726 ..... B84-10125 06
LEW-13874 ..... B84-10126 06
LEW-13875 ..... B84-10105 06
LEW-13894 ..... B84-10128 06
LEW-13930 ..... B84-10129 06
LEW-14018 ..... B84-10392 08
LEW-14019 ..... B84-10279 03
LEW-14034 ..... B84-10225 01
LEW-14058 ..... B84-10103 06
LEW-14062 ..... B84-10337 06

MFS-19370 ..... B84-10405 08
MFS-19479 ..... B84-10158 07
MFS-19625 ..... B84-10140 06
MFS-19694 ..... B84-10169 07
MFS-19705 ..... B84-10200 08
MFS-19733 ..... B84-10369 07
MFS-19738 ..... B84-10201 08
MFS-19741 ..... B84-10024 01
MFS-19751 ..... B84-10019 01
MFS-19754 ..... B84-10306 04
MFS-19764 ..... B84-10191 08
MFS-19778 ..... B84-10162 07
MFS-19779 ..... B84-10145 06
MFS-19786 ..... B84-10091 04
MFS-19792 ..... B84-10327 06
MFS-19824 ..... B84-10138 06
MFS-19825 ..... B84-10180 08
MFS-19826 ..... B84-10136 06
MFS-19830 ..... B84-10115 06
MFS-19852 ..... B84-10163 07
MFS-19857 ..... B84-10182 08
MFS-19871 ..... B84-10364 07
MFS-19872 ..... B84-10231 01
MFS-19873 ..... B84-10304 04
MFS-19874 ..... B84-10370 07
MFS-19875 ..... B84-10355 06
MFS-19877 ..... B84-10114 06
MFS-19890 ..... B84-10365 07
MFS-19891 ..... B84-10168 07
MFS-19899 ..... B84-10359 07
MFS-19914 ..... B84-10336 06
MFS-19917 ..... B84-10270 02
MFS-23936 ..... B84-10373 07
MFS-25119 ..... B84-10246 01
MFS-25533 ..... B84-10042 02
MFS-25592 ..... B84-10047 02
MFS-25593 ..... B84-10099 05
MFS-25657 ..... B84-10092 04
MFS-25672 ..... B84-10197 08
MFS-25716 ..... B84-10188 08
MFS-25793 ..... B84-10117 06
MFS-25806 ..... B84-10189 08
MFS-25808 ..... B84-10095 05
MFS-25833 ..... B84-10104 06
MFS-25846 ..... B84-10081 04
MFS-25851 ..... B84-10309 04
MFS-25859 ..... B84-10082 04
MFS-25862 ..... B84-10324 06
MFS-25876 ..... B84-10204 09
MFS-25892 ..... B84-10055 03
MFS-25905 ..... B84-10075 04
MFS-25912 ..... B84-10053 03
MFS-25914 ..... B84-10025 01
MFS-25918 ..... B84-10156 07
MFS-25924 ..... B84-10008 01
MFS-25927 ..... B84-10226 01
MFS-25928 ..... B84-10096 05
MFS-25931 ..... B84-10110 06
MFS-25933 ..... B84-10102 06
MFS-25937 ..... B84-10084 04
MFS-25939 ..... B84-10106 06
MFS-25941 ..... B84-10116 06
MFS-25944 ..... B84-10010 01
MFS-25945 ..... B84-10177 08
MFS-25948 ..... B84-10196 08
MFS-25951 ..... B84-10141 06
MFS-25961 ..... B84-10107 06
MFS-25963 ..... B84-10101 06
MFS-25966 ..... B84-10166 07
MFS-25968 ..... B84-10028 02
MFS-25969 ..... B84-10368 07
MFS-25975 ..... B84-10181 08
MFS-25978 ..... B84-10157 07
MFS-25990 ..... B84-10343 06
MFS-27000 ..... B84-10064 03
MFS-27006 ..... B84-10088 04
MFS-27007 ..... B84-10183 08
MFS-27031 ..... B84-10085 04
MFS-27032 ..... B84-10142 06
MFS-27045 ..... B84-10322 05
MFS-28008 ..... B84-10354 06
MFS-28011 ..... B84-10353 06

MSC-16278 ..... B84-10399 08
MSC-20240 ..... B84-10263 02
MSC-20241 ..... B84-10159 07
MSC-20254 ..... B84-10382 08
MSC-20278 ..... B84-10211 09
MSC-20308 ..... B84-10409 09
MSC-20333 ..... B84-10143 06
MSC-20398 ..... B84-10331 06
MSC-20414 ..... B84-10363 07
MSC-20416 ..... B84-10248 01
MSC-20418 ..... B84-10323 06

PAGE I-34 INTENTIONALLY BLANK

PRECEDING PAGE BLANK NOT FILMED

MSC-20429 ..... B84-10044 02
MSC-20440 ..... B84-10362 07
MSC-20448 ..... B84-10133 06
MSC-20451 ..... B84-10326 06
MSC-20505 ..... B84-10332 06
MSC-20512 ..... B84-10378 07
MSC-20518 ..... B84-10155 07
MSC-20519 ..... B84-10329 06
MSC-20535 ..... B84-10356 07
MSC-20540 ..... B84-10396 08
MSC-20556 ..... B84-10249 01
MSC-20570 ..... B84-10387 08
MSC-20587 ..... B84-10339 06
MSC-20588 ..... B84-10383 08
MSC-20589 ..... B84-10122 06
MSC-20590 ..... B84-10135 06
MSC-20604 ..... B84-10419 09
MSC-20615 ..... B84-10330 06
MSC-20626 ..... B84-10237 01
MSC-20633 ..... B84-10212 09
MSC-20635 ..... B84-10119 06
MSC-20641 ..... B84-10013 01
MSC-20644 ..... B84-10134 06
MSC-20645 ..... B84-10153 07
MSC-20683 ..... B84-10216 09
MSC-20694 ..... B84-10241 01
MSC-20698 ..... B84-10398 08
MSC-20699 ..... B84-10035 02
MSC-20700 ..... B84-10132 06
MSC-20701 ..... B84-10130 06
MSC-20704 ..... B84-10388 08
MSC-20723 ..... B84-10367 07

NPO-13446 ..... B84-10029 02
NPO-14048 ..... B84-10251 01
NPO-14151 ..... B84-10098 05
NPO-14311 ..... B84-10233 01
NPO-14771 ..... B84-10152 07
NPO-14865 ..... B84-10299 03
NPO-14869 ..... B84-10041 02
NPO-14874 ..... B84-10312 04
NPO-14973 ..... B84-10313 04
NPO-14999 ..... B84-10411 09
NPO-15004 ..... B84-10379 08
NPO-15005 ..... B84-10261 02
NPO-15006 ..... B84-10026 02
NPO-15024 ..... B84-10262 02
NPO-15028 ..... B84-10250 01
NPO-15057 ..... B84-10389 08
NPO-15061 ..... B84-10235 01
NPO-15064 ..... B84-10258 02
NPO-15071 ..... B84-10293 03
NPO-15076 ..... B84-10074 04
NPO-15077 ..... B84-10385 08
NPO-15082 ..... B84-10390 08
NPO-15086 ..... B84-10275 02
NPO-15088 ..... B84-10213 09
NPO-15095 ..... B84-10094 05
NPO-15096 ..... B84-10076 04
NPO-15098 ..... B84-10172 08
NPO-15101 ..... B84-10259 02
NPO-15104 ..... B84-10093 04
NPO-15110 ..... B84-10170 08
NPO-15115 ..... B84-10150 07
NPO-15122 ..... B84-10030 02
NPO-15124 ..... B84-10052 03
NPO-15125 ..... B84-10395 08
NPO-15126 ..... B84-10394 08
NPO-15127 ..... B84-10173 08
NPO-15129 ..... B84-10393 08
NPO-15132 ..... B84-10254 01
NPO-15134 ..... B84-10003 01
NPO-15135 ..... B84-10338 06
NPO-15139 ..... B84-10149 07
NPO-15142 ..... B84-10244 01
NPO-15171 ..... B84-10305 04
NPO-15190 ..... B84-10062 03

NPO-15229 ..... B84-10034 02
NPO-15264 ..... B84-10045 02
NPO-15277 ..... B84-10070 03
NPO-15330 ..... B84-10049 02
NPO-15331 ..... B84-10416 09
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NPO-15397 ..... B84-10295 03
NPO-15424 ..... B84-10315 04
NPO-15428 ..... B84-10292 03
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NPO-15535 ..... B84-10320 04
NPO-15542 ..... B84-10224 09
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NPO-15568 ..... B84-10205 09
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NPO-15596 ..... B84-10073 03
NPO-15615 ..... B84-10018 01
NPO-15619 ..... B84-10272 02
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NPO-15656 ..... B84-10310 04
NPO-15660 ..... B84-10161 07
NPO-15663 ..... B84-10083 04
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NPO-15691 ..... B84-10100 05
NPO-15696 ..... B84-10046 02
NPO-15704 ..... B84-10032 02
NPO-15705 ..... B84-10137 06
NPO-15707 ..... B84-10039 02
NPO-15712 ..... B84-10097 05
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NPO-15725 ..... B84-10012 01
NPO-15726 ..... B84-10214 09
NPO-15733 ..... B84-10068 03
NPO-15742 ..... B84-10377 07
NPO-15745 ..... B84-10174 08
NPO-15746 ..... B84-10066 03
NPO-15749 ..... B84-10072 03
NPO-15761 ..... B84-10139 06
NPO-15765 ..... B84-10037 02
NPO-15766 ..... B84-10016 01
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NPO-15816 ..... B84-10195 08
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NPO-15832 ..... B84-10219 09

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NPO-15834 ..... B84-10146 07
NPO-15848 ..... B84-10160 07
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NPO-15862 ..... B84-10209 09
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NPO-15865 ..... B84-10278 03
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NPO-15875 ..... B84-10009 01
NPO-15883 ..... B84-10021 01
NPO-15890 ..... B84-10004 01
NPO-15893 ..... B84-10020 01
NPO-15894 ..... B84-10069 03
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NPO-15900 ..... B84-10192 08
NPO-15904 ..... B84-10178 08
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NPO-15936 ..... B84-10407 08
NPO-15937 ..... B84-10054 03
NPO-15939 ..... B84-10265 02
NPO-15941 ..... B84-10202 09
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NPO-15965 ..... B84-10077 04
NPO-15966 ..... B84-10284 03
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NPO-15972 ..... B84-10060 03
NPO-15975 ..... B84-10087 04
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NPO-15982 ..... B84-10228 01
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NPO-15993 ..... B84-10219 09
NPO-15994 ..... B84-10386 08
NPO-15999 ..... B84-10269 02
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NPO-16001 ..... B84-10033 02
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NPO-16026 ..... B84-10011 01
NPO-16027 ..... B84-10348 06
NPO-16029 ..... B84-10222 09
NPO-16032 ..... B84-10187 08
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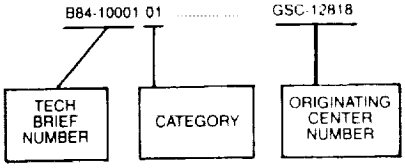
NPO-16060 ..... B84-10300 03
NPO-16062 ..... B84-10314 04
NPO-16063 ..... B84-10247 01
NPO-16064 ..... B84-10144 06
NPO-16066 ..... B84-10179 08
NPO-16074 ..... B84-10048 02
NPO-16075 ..... B84-10308 04
NPO-16078 ..... B84-10165 07
NPO-16086 ..... B84-10002 01
NPO-16099 ..... B84-10374 07
NPO-16100 ..... B84-10302 03
NPO-16101 ..... B84-10285 03
NPO-16112 ..... B84-10234 01
NPO-16118 ..... B84-10229 01
NPO-16119 ..... B84-10372 07
NPO-16120 ..... B84-10148 07
NPO-16123 ..... B84-10223 09
NPO-16124 ..... B84-10420 09
NPO-16125 ..... B84-10417 09
NPO-16127 ..... B84-10317 04

NPO-16128 ..... B84-10360 07
NPO-16131 ..... B84-10113 06
NPO-16145 ..... B84-10301 03
NPO-16146 ..... B84-10406 08
NPO-16154 ..... B84-10221 09
NPO-16159 ..... B84-10056 03
NPO-16160 ..... B84-10079 04
NPO-16164 ..... B84-10059 03
NPO-16168 ..... B84-10240 01
NPO-16172 ..... B84-10118 06
NPO-16201 ..... B84-10208 09
NPO-16202 ..... B84-10208 09
NPO-16205 ..... B84-10404 08
NPO-16217 ..... B84-10015 01
NPO-16222 ..... B84-10311 04
NPO-16227 ..... B84-10319 04
NPO-16234 ..... B84-10210 09
NPO-16236 ..... B84-10283 03
NPO-16237 ..... B84-10412 09
NPO-16238 ..... B84-10190 08
NPO-16239 ..... B84-10227 01
NPO-16242 ..... B84-10289 03
NPO-16251 ..... B84-10418 09
NPO-16262 ..... B84-10239 01
NPO-16266 ..... B84-10286 03
NPO-16272 ..... B84-10014 01
NPO-16291 ..... B84-10400 08
NPO-16294 ..... B84-10403 08
NPO-16301 ..... B84-10276 02
NPO-16398 ..... B84-10086 04
NPO-16485 ..... B84-10038 02

Typical Tech Brief Number Index Listing



The left hand column identifies the Tech Brief number, e.g., B84-10001, followed by a two-digit number, e.g., 01, which identifies the subject category containing the entire citation. Following the subject category number is the originating Center number.

B84-10001 01 ..... GSC-12818
B84-10002 01 ..... NPO-16086
B84-10003 01 ..... NPO-15134
B84-10004 01 ..... NPO-15890
B84-10005 01 ..... NPO-15551
B84-10006 01 ..... NPO-15963
B84-10007 01 ..... NPO-15978
B84-10008 01 ..... MFS-25924
B84-10009 01 ..... NPO-15875
B84-10010 01 ..... MFS-25944
B84-10011 01 ..... NPO-16026
B84-10012 01 ..... NPO-15725
B84-10013 01 ..... MSC-20641
B84-10014 01 ..... NPO-16272
B84-10015 01 ..... NPO-16217
B84-10016 01 ..... NPO-15766
B84-10017 01 ..... NPO-15380
B84-10018 01 ..... NPO-15615
B84-10019 01 ..... MFS-19751
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B84-10021 01 ..... NPO-15883
B84-10022 01 ..... NPO-15926
B84-10023 01 ..... NPO-16000
B84-10024 01 ..... MFS-19741
B84-10025 01 ..... MFS-25914
B84-10026 02 ..... NPO-15006
B84-10027 02 ..... NPO-15633
B84-10028 02 ..... MFS-25968
B84-10029 02 ..... NPO-13446
B84-10030 02 ..... NPO-15122
B84-10031 02 ..... KSC-11273
B84-10032 02 ..... NPO-15704
B84-10033 02 ..... NPO-16001
B84-10034 02 ..... NPO-15229
B84-10035 02 ..... MSC-20699
B84-10036 02 ..... NPO-15782
B84-10037 02 ..... NPO-15765
B84-10038 02 ..... NPO-16485
B84-10039 02 ..... NPO-15707
B84-10040 02 ..... NPO-15833
B84-10041 02 ..... NPO-14869
B84-10042 02 ..... MFS-25533
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B84-10044 02 ..... MSC-20429
B84-10045 02 ..... NPO-15264
B84-10046 02 ..... NPO-15696
B84-10047 02 ..... MFS-25592
B84-10048 02 ..... NPO-16074
B84-10049 02 ..... NPO-15330
B84-10050 03 ..... LAR-12966
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B84-10052 03 ..... NPO-15124
B84-10053 03 ..... MFS-25912
B84-10054 03 ..... NPO-15937
B84-10055 03 ..... MFS-25892
B84-10056 03 ..... NPO-16159
B84-10057 03 ..... GSC-12823
B84-10058 03 ..... NPO-15440
B84-10059 03 ..... NPO-16164
B84-10060 03 ..... NPO-15972
B84-10061 03 ..... NPO-15558
B84-10062 03 ..... NPO-15190
B84-10063 03 ..... NPO-15981
B84-10064 03 ..... MFS-27000
B84-10065 03 ..... KSC-11274
B84-10066 03 ..... NPO-15746
B84-10067 03 ..... NPO-15516
B84-10068 03 ..... NPO-15733
B84-10069 03 ..... NPO-15894
B84-10070 03 ..... NPO-15277
B84-10071 03 ..... NPO-15795
B84-10072 03 ..... NPO-15749
B84-10073 03 ..... NPO-15596
B84-10074 04 ..... NPO-15076
B84-10075 04 ..... MFS-25905
B84-10076 04 ..... NPO-15096
B84-10077 04 ..... NPO-15965
B84-10078 04 ..... NPO-15824
B84-10079 04 ..... NPO-16160
B84-10080 04 ..... NPO-15648
B84-10081 04 ..... MFS-25846
B84-10082 04 ..... MFS-25859
B84-10083 04 ..... NPO-15663
B84-10084 04 ..... MFS-25937
B84-10085 04 ..... MFS-27031
B84-10086 04 ..... NPO-16398
B84-10087 04 ..... NPO-15975
B84-10088 04 ..... MFS-27006
B84-10089 04 ..... NPO-15802
B84-10090 04 ..... NPO-15849
B84-10091 04 ..... MFS-19786
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B84-10093 04 ..... NPO-15104
B84-10094 05 ..... NPO-15095
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B84-10096 05 ..... MFS-25928
B84-10097 05 ..... NPO-15712
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B84-10099 05 ..... MFS-25593
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B84-10101 06 ..... MFS-25963
B84-10102 06 ..... MFS-25933
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B84-10104 06 ..... MFS-25833
B84-10105 06 ..... LEW-13875
B84-10106 06 ..... MFS-25939
B84-10107 06 ..... MFS-25961
B84-10108 06 ..... LAR-13087
B84-10109 06 ..... GSC-12864
B84-10110 06 ..... MFS-25931
B84-10111 06 ..... LAR-12808
B84-10112 06 ..... LAR-12965
B84-10113 06 ..... NPO-16131
B84-10114 06 ..... MFS-19877
B84-10115 06 ..... MFS-19830
B84-10116 06 ..... MFS-25941
B84-10117 06 ..... MFS-25793
B84-10118 06 ..... NPO-16172
B84-10119 06 ..... MSC-20635
B84-10120 06 ..... LAR-12879
B84-10121 06 ..... LAR-13091
B84-10122 06 ..... MSC-20589
B84-10123 06 ..... GSC-12810
B84-10124 06 ..... LAR-13116
B84-10125 06 ..... LEW-13726
B84-10126 06 ..... LEW-13874
B84-10127 06 ..... LEW-13655
B84-10128 06 ..... LEW-13894
B84-10129 06 ..... LEW-13930
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B84-10131 06 ..... NPO-15586
B84-10132 06 ..... MSC-20700
B84-10133 06 ..... MSC-20448
B84-10134 06 ..... MSC-20644
B84-10135 06 ..... MSC-20590
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B84-10137 06 ..... NPO-15705
B84-10138 06 ..... MFS-19824
B84-10139 06 ..... NPO-15761
B84-10140 06 ..... MFS-19625
B84-10141 06 ..... MFS-25951
B84-10142 06 ..... MFS-27032
B84-10143 06 ..... MSC-20333
B84-10144 06 ..... NPO-16064
B84-10145 06 ..... MFS-19779
B84-10146 07 ..... NPO-15834
B84-10147 07 ..... GSC-12916
B84-10148 07 ..... NPO-16120
B84-10149 07 ..... NPO-15139
B84-10150 07 ..... NPO-15115
B84-10151 07 ..... NPO-15861
B84-10152 07 ..... NPO-14771
B84-10153 07 ..... MSC-20645
B84-10154 07 ..... NPO-15474
B84-10155 07 ..... MSC-20518
B84-10156 07 ..... MFS-25918
B84-10157 07 ..... MFS-25978
B84-10158 07 ..... MFS-19479
B84-10159 07 ..... MSC-20241
B84-10160 07 ..... NPO-15848
B84-10161 07 ..... NPO-15660
B84-10162 07 ..... MFS-19778
B84-10163 07 ..... MFS-19852
B84-10164 07 ..... NPO-15621
B84-10165 07 ..... NPO-16078
B84-10166 07 ..... MFS-25966
B84-10167 07 ..... NPO-15482
B84-10168 07 ..... MFS-19891
B84-10169 07 ..... MFS-19694
B84-10170 08 ..... NPO-15110
B84-10171 08 ..... NPO-15863
B84-10172 08 ..... NPO-15098
B84-10173 08 ..... NPO-15127
B84-10174 08 ..... NPO-15745

PAGE 1-38 INTENTIONALLY BLANK

PRECEDING PAGE BLANK NOT FILMED

B84-10175 08 ..... LAR-12846
B84-10176 08 ..... LAR-13066
B84-10177 08 ..... MFS-25945
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B84-10184 08 ..... NPO-16022
B84-10185 08 ..... NPO-15793
B84-10186 08 ..... NPO-15569
B84-10187 08 ..... NPO-16032
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B84-10189 08 ..... MFS-25806
B84-10190 08 ..... NPO-16238
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B84-10195 08 ..... NPO-15816
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B84-10197 08 ..... MFS-25672
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B84-10201 08 ..... MFS-19738
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B84-10207 09 ..... LAR-12943
LAR-12944
LAR-12945
B84-10208 09 ..... NPO-16201
NPO-16202
B84-10209 09 ..... NPO-15862
B84-10210 09 ..... NPO-16234
B84-10211 09 ..... MSC-20278
B84-10212 09 ..... MSC-20633
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B84-10215 09 ..... GSC-12833
B84-10216 09 ..... MSC-20683
B84-10217 09 ..... KSC-11226
B84-10218 09 ..... KSC-11277
B84-10219 09 ..... NPO-15832
NPO-15993
B84-10220 09 ..... KSC-11134
B84-10221 09 ..... NPO-16154
B84-10222 09 ..... NPO-16029
B84-10223 09 ..... NPO-16123
B84-10224 09 ..... NPO-15542
B84-10225 01 ..... LEW-14034
B84-10226 01 ..... MFS-25927
B84-10227 01 ..... NPO-16239
B84-10228 01 ..... NPO-15982
B84-10229 01 ..... NPO-16118
B84-10230 01 ..... NPO-15943
B84-10231 01 ..... MFS-19872
B84-10232 01 ..... NPO-15921
B84-10233 01 ..... NPO-14311
B84-10234 01 ..... NPO-16112
B84-10235 01 ..... NPO-15061
B84-10236 01 ..... NPO-15977
B84-10237 01 ..... MSC-20626
B84-10238 01 ..... NPO-15931
B84-10239 01 ..... NPO-16262
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B84-10241 01 ..... MSC-20694
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B84-10243 01 ..... KSC-11283
B84-10244 01 ..... NPO-15142
B84-10245 01 ..... GSC-12876
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B84-10247 01 ..... NPO-16063
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B84-10257 02 ..... NPO-15653
B84-10258 02 ..... NPO-15064
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B84-10267 02 ..... NPO-15566
B84-10268 02 ..... GSC-12862
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B84-10273 02 ..... NPO-15945
B84-10274 02 ..... NPO-15345
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B84-10279 03 ..... LEW-14019
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B84-10281 03 ..... LAR-13030
B84-10282 03 ..... LAR-13140
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B84-10284 03 ..... NPO-15966
B84-10285 03 ..... NPO-16101
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B84-10287 03 ..... NPO-15687
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B84-10292 03 ..... NPO-15428
B84-10293 03 ..... NPO-15071
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B84-10295 03 ..... NPO-15397
B84-10296 03 ..... NPO-15771
B84-10297 03 ..... NPO-15430
B84-10298 03 ..... NPO-15930
B84-10299 03 ..... NPO-14865
B84-10300 03 ..... NPO-16060
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B84-10302 03 ..... NPO-16100
B84-10303 04 ..... NPO-15924
B84-10304 04 ..... MFS-19873
B84-10305 04 ..... NPO-15171
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B84-10307 04 ..... ARC-11407
B84-10308 04 ..... NPO-16075
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B84-10310 04 ..... NPO-15656
B84-10311 04 ..... NPO-16222
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B84-10313 04 ..... NPO-14973
B84-10314 04 ..... NPO-16062
B84-10315 04 ..... NPO-15424
B84-10316 04 ..... NPO-15530
B84-10317 04 ..... NPO-16127
B84-10318 04 ..... NPO-15851
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B84-10322 05 ..... MFS-27045
B84-10323 06 ..... MSC-20418
B84-10324 06 ..... MFS-25862
B84-10325 06 ..... NPO-15436
NPO-15441
B84-10326 06 ..... MSC-20451
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B84-10328 06 ..... LAR-13134
B84-10329 06 ..... MSC-20519
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B84-10331 06 ..... MSC-20398
B84-10332 06 ..... MSC-20505
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B84-10334 06 ..... LAR-13157
B84-10335 06 ..... LAR-13094
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B84-10338 06 ..... NPO-15135
B84-10339 06 ..... MSC-20587
B84-10340 06 ..... NPO-15788
B84-10341 06 ..... LAR-13144
B84-10342 06 ..... LAR-13051
B84-10343 06 ..... MFS-25990
B84-10344 06 ..... LAR-12975
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B84-10347 06 ..... FRC-11072
B84-10348 06 ..... NPO-16027
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B84-10350 06 ..... LAR-13117
B84-10351 06 ..... LAR-13113
B84-10352 06 ..... LAR-13100
B84-10353 06 ..... MFS-28011
B84-10354 06 ..... MFS-28008
B84-10355 06 ..... MFS-19875
B84-10356 07 ..... MSC-20535
B84-10357 07 ..... LAR-13076
B84-10358 07 ..... LAR-12979
B84-10359 07 ..... MFS-19899
B84-10360 07 ..... NPO-16128
B84-10361 07 ..... LEW-10455
B84-10362 07 ..... MSC-20440
B84-10363 07 ..... MSC-20414
B84-10364 07 ..... MFS-19871
B84-10365 07 ..... MFS-19890
B84-10366 07 ..... GSC-12915
B84-10367 07 ..... MSC-20723
B84-10368 07 ..... MFS-25969
B84-10369 07 ..... MFS-19733
B84-10370 07 ..... MFS-19874
B84-10371 07 ..... LAR-13141
LAR-13142
B84-10372 07 ..... NPO-16119
B84-10373 07 ..... MFS-23936
B84-10374 07 ..... NPO-16099
B84-10375 07 ..... NPO-15831
B84-10376 07 ..... NPO-15783
B84-10377 07 ..... NPO-15742
B84-10378 07 ..... MSC-20512
B84-10379 08 ..... NPO-15004
B84-10380 08 ..... LAR-13070
B84-10381 08 ..... LAR-13007
B84-10382 08 ..... MSC-20254
B84-10383 08 ..... MSC-20588
B84-10384 08 ..... ARC-11397
B84-10385 08 ..... NPO-15077
B84-10386 08 ..... NPO-15994
B84-10387 08 ..... MSC-20570
B84-10388 08 ..... MSC-20704
B84-10389 08 ..... NPO-15057
B84-10390 08 ..... NPO-15082
B84-10391 08 ..... NPO-15853
B84-10392 08 ..... LEW-14018
B84-10393 08 ..... NPO-15129
B84-10394 08 ..... NPO-15126
B84-10395 08 ..... NPO-15125
B84-10396 08 ..... MSC-20540
B84-10397 08 ..... LAR-13119
B84-10398 08 ..... MSC-20698
B84-10399 08 ..... MSC-16278

B84-10400 08 ..... NPO-16291
B84-10401 08 ..... NPO-15778
B84-10402 08 ..... NPO-15724
B84-10403 08 ..... NPO-16294
B84-10404 08 ..... NPO-16205
B84-10405 08 ..... MFS-19370
B84-10406 08 ..... NPO-16146
B84-10407 08 ..... NPO-15936
B84-10408 08 ..... ARC-11310
B84-10409 09 ..... MSC-20308
B84-10410 09 ..... NPO-15976
B84-10411 09 ..... NPO-14999
B84-10412 09 ..... NPO-16237
B84-10413 09 ..... NPO-15814
B84-10414 09 ..... GSC-12861
B84-10415 09 ..... GSC-12768
B84-10416 09 ..... NPO-15331
B84-10417 09 ..... NPO-16125
B84-10418 09 ..... NPO-16251
B84-10419 09 ..... MSC-20604
B84-10420 09 ..... NPO-16124